Air Force
Environmental Planning Division
(HQ USAF/CEVP)

Room 5B269
1260 Air Force Pentagon
Washington, DC 20330-1260

16 JUL 93

MEMORANDUM FOR DTIC (ACQUISITION)
(ATTN: PATTI MAUBY)

SUBJ: DISTRIBUTION OF USAF PLANNING DOCUMENTS FORWARDED ON 1 JULY 93

ALL THE DOCUMENTS FORWARDED TO your organization on the subject date should be considered Approved for Public Release, Distribution is unlimited (Distribution statement A).

Jack Bush, GM-14
Mr. Jack Bush
Special Projects and Plans
703-697-2928
DSN 227-2928

FINAL ENVIRONMENTAL PLANNING
TECHNICAL REPORT

TRANSPORTATION

January 1984

Accession For	
NTIS CRA&I	X
DTIC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

DTIC ... ECTED 1

JUL 2 3 1988

PREFACE

The President has directed that the Air Force deploy the Peacekeeper missile system at a location near F.E. Warren Air Force Base (hereafter F.E. Warren AFB) close to Cheyenne, Wyoming. The Peacekeeper system (formerly known as the M-X system) is an advanced, land-based intercontinental ballistic missile. The plan calls for the replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Existing missile silos will be used, and there will be very little structural modification needed. Missile replacement will occur within the two squadrons (of 50 missiles each) located nearest F.E. Warren AFB, the 319th and 400th Strategic Missile Squadrons. Peacekeeper deployment will occur between 1984 and 1989.

An environmental impact statement (EIS) was prepared for the Proposed Action as outlined above. Information contained in the EIS is based upon environmental information and analysis developed and reported in a series of 13 final environmental planning technical reports (EPTRs). This volume is one of those reports. The 13 resource areas are:

- Socioeconomics (employment demand, housing, public finance, construction resources, and social well-being);
- Public Services and Facilities;
- Utilities;
- Energy Resources;
- Transportation;
- Land Use (land use, recreation, and visual resources);
- Cultural and Paleontological Resources;
- Water Resources;
- Biological Resources;
- Geologic Resources;
- Noise;
- Air Quality;
- Jurisdictional.

TRANSPORTATION

CONTENTS | Page

CONTENTS

CONTENTS | Page

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

LIST OF FIGURES

1.0

INTRODUCTION

1.0 INTRODUCTION

This final environmental planning technical report (EPTR) is a companion document to the transporation section of the final environmental impact statement (FEIS) for the Peacekeeper in Minuteman Silos project. It provides data, methodologies, and analyses which supplement and extend those presented in the FEIS.

This final EPTR consists of six major sections. Section 1.0 provides an overview of the Peacekeeper in Minuteman Silos project and a description of the transportation resource and its elements.

Section 2.0 presents a detailed description of the environment potentially affected by the project. It includes a capsule description of the environmental setting (Section 2.1) and project requirements (Section 2.2). Section 2.3 defines the Region of Influence and Area of Concentrated Study for the resource. Section 2.4 (Derivation of Data Base) follows with a discussion of the literature sources, group and agency contacts, and primary data which provide the data base for the report. Section 2.5 describes analytic methods used to determine existing environmental conditions in the Region of Influence. Detailed analyses of the existing environment, broken down by constituent elements of the resource, follow in Section 2.6.

Section 3.0 describes environmental consequences of the Proposed Action and its project element alternatives, the No Action Alternative, mitigation measures, and unavoidable impacts. It contains detailed definitions of each potential level of impact (negligible, low, moderate, and high) for both short-term and long-term impacts. Beneficial effects are also discussed. Definitions of significance are also included. Methods used for analyzing future baseline and project impacts are described, as are assumptions and assumed mitigations. Additional mitigation measures to reduce project impacts are also described.

Sections 4.0 (Glossary), 5.0 (References), and 6.0 (List of Preparers) conclude the EPTR.

1.1 Peacekeeper in Minuteman Silos

The Peacekeeper system, which the Air Force plans to deploy within the 90th Strategic Missile Wing at F.E. Warren Air Force Base (AFB), Wyoming, is an advanced land-based intercontinental ballistic missile system designed to improve the nation's strategic deterrent force. Deployment of the Peacekeeper calls for replacement of 100 existing Minuteman III missiles with 100 Peacekeeper missiles. Missile replacement will occur in the 319th and 400th Strategic Missile Squadrons, located nearest F.E. Warren AFB (Figure 1.1-1). The Deployment Area covers parts of southeastern Wyoming and the southwestern Nebraska Panhandle.

Construction at F.E. Warren AFB will occur between 1984 and 1986. Fourteen new buildings will be constructed, and modifications or additions will be made to 11 existing buildings. Approximately 400,000 square feet of floor space will be built or modified. A new road configuration, to be selected from three alternatives, is proposed to link Peacekeeper facilities onbase and to provide improved access to or from the base (Figures 1.1-2, 1.1-3, and 1.1-4).

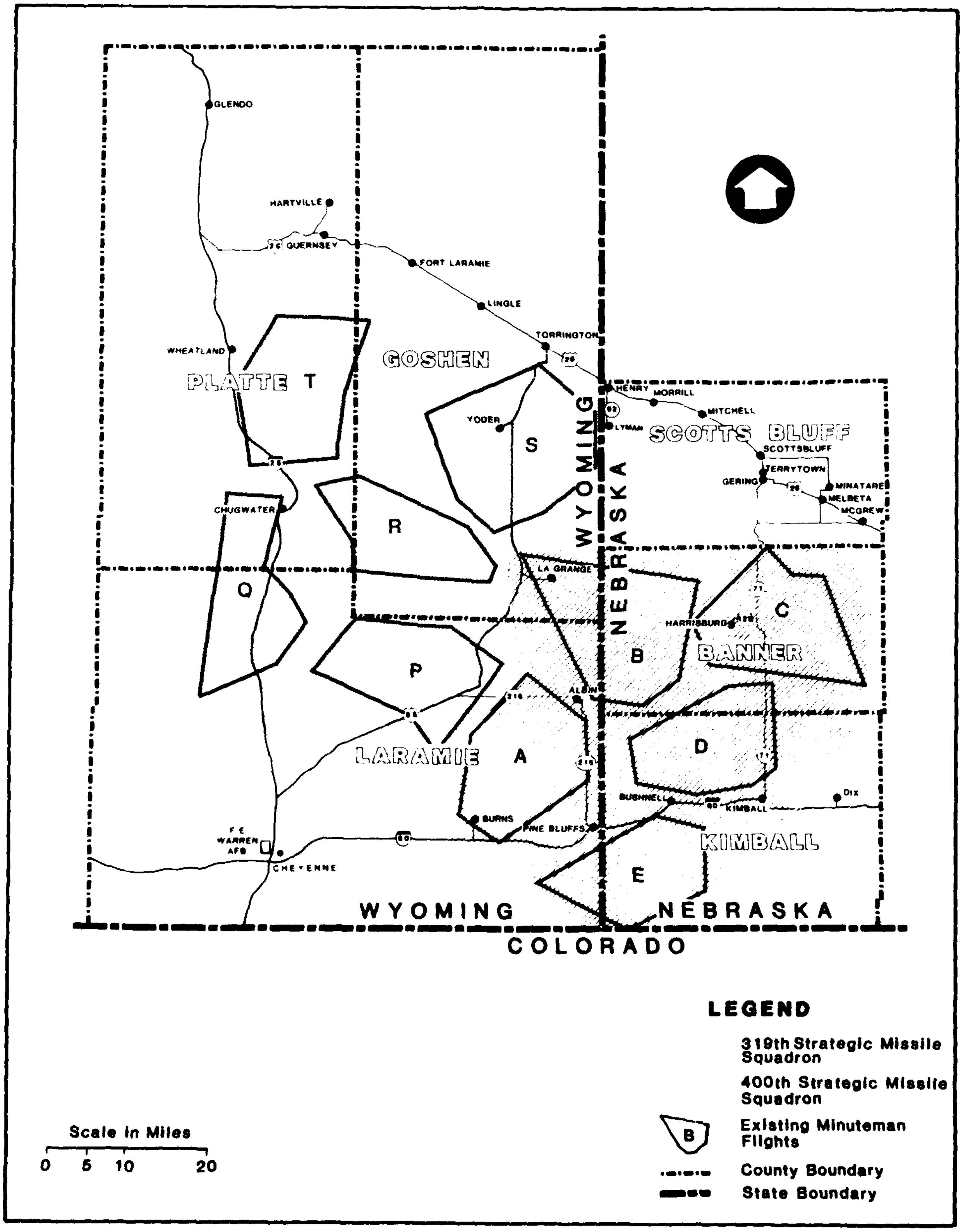


FIGURE 1.1-1 PEACEKEEPER DEPLOYMENT AREA

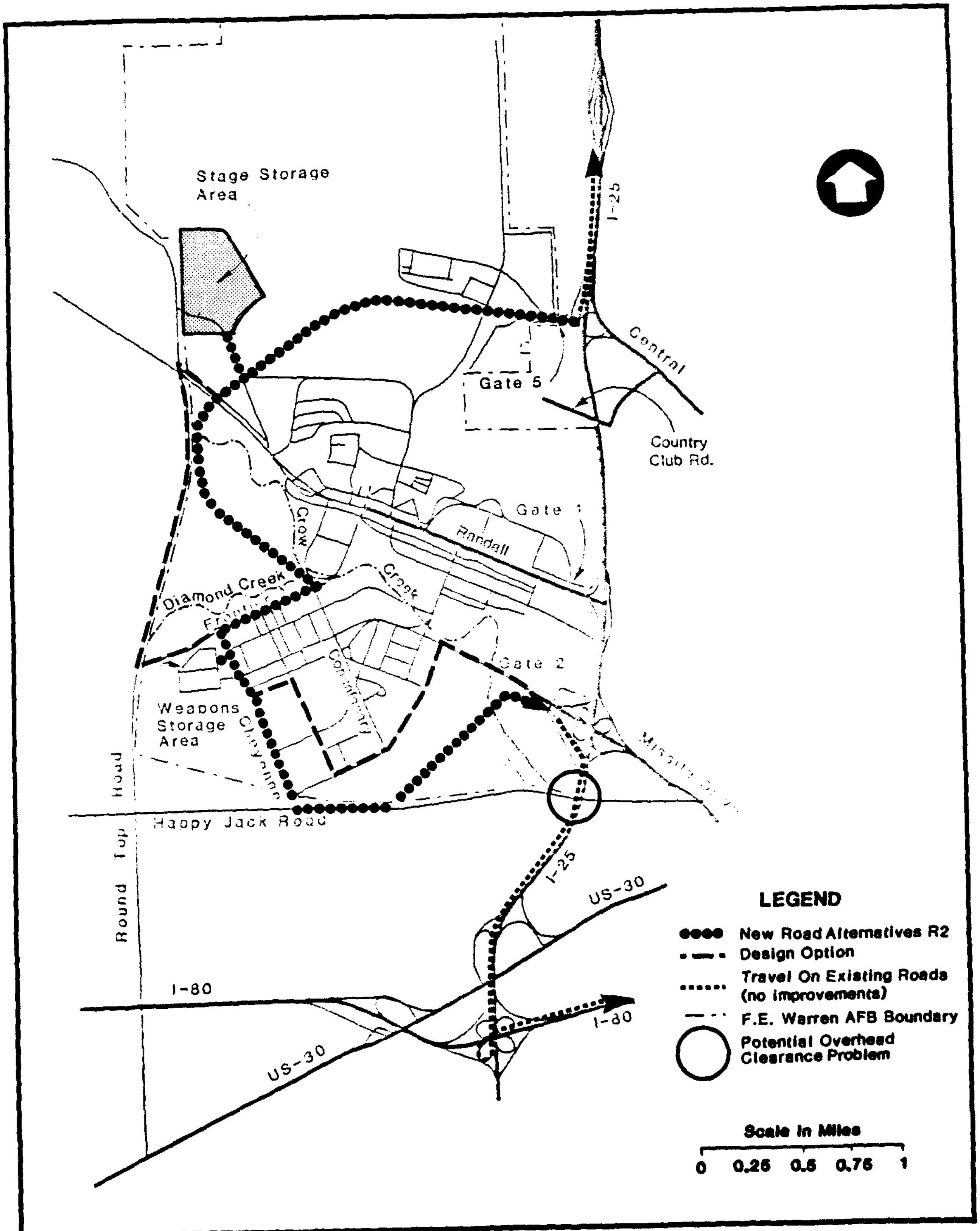


FIGURE 1.1-2 NEW ROADS AT F.E. WARREN AFB: PROPOSED ACTION R2

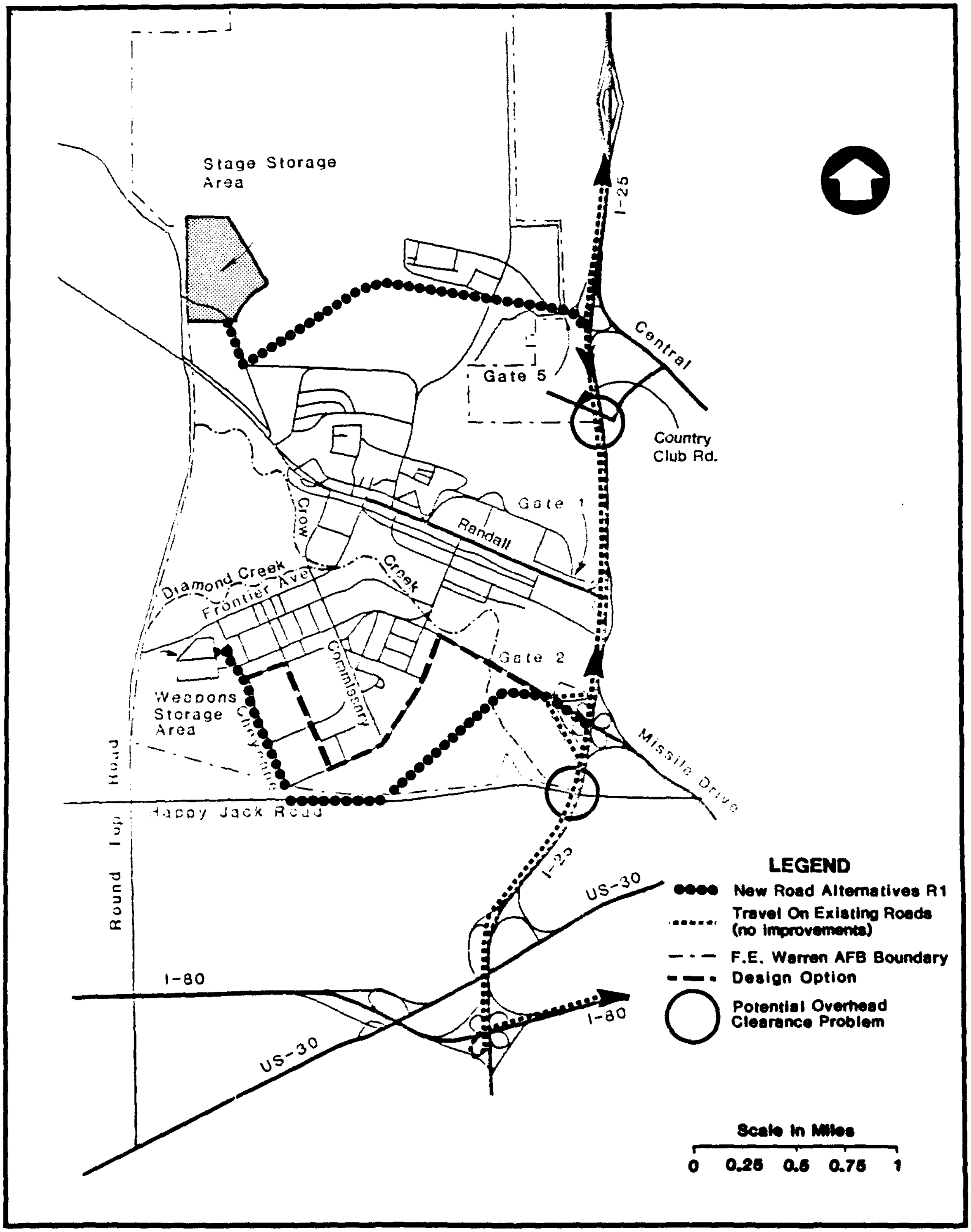


FIGURE 1.1-3 NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R1

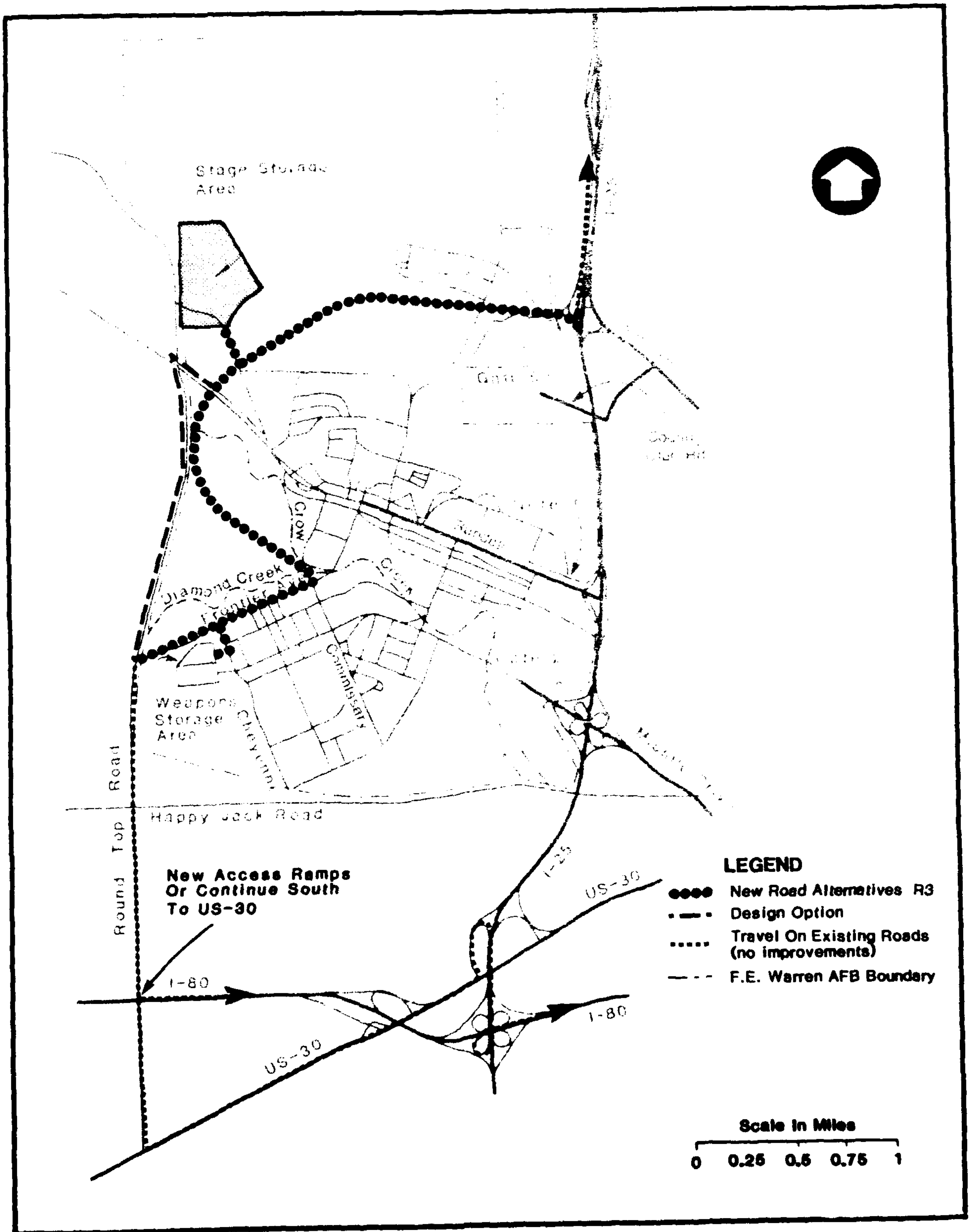


FIGURE 1.1-4 NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R3

Work in the Deployment Area will take place between 1985 and 1989. Many of the access roads to the Launch Facilities will be upgraded. Bridge clearance problems will be corrected, and some culverts and bridges may need to be upgraded. Below-ground modifications will be related to removal of Minuteman support hardware, insertion of a protective canister to enclose the Peacekeeper, and installation of communications systems and support equipment.

A total of 11 alternatives have been chosen as candidate routes for communication connectivity between Squadrons 319 and 400 (Figure 1.1-5). Five routes will be selected for installation. Total buried cable length will range from approximately 82 to 110 miles, depending upon final route selections.

Under the Proposed Action two dispatch stations would be established, one each in the northern and eastern portions of the Deployment Area. Although actual locations have not been selected, Chugwater, Wyoming and Kimball, Nebraska are representative locations analyzed in the Final Environmental Impact Statement and in this EPTR. Dispatch stations would be not more than 5 acres in size and would be used for the temporary open storage of equipment and material. One or more buildings would also be present at each site for contractor use as office space. All dispatch stations would be removed prior to project completion. In addition to the Proposed Action, two alternatives are considered in this environmental impact assessment:

1) One dispatch station only, in the eastern part of the Deployment Area; or

2) No dispatch stations.

Two options have been identified for resurfacing Deployment Area roads. Surfacing Option A involves gravel upgrades of 252 miles of existing gravel roads and the paving or repaving of 390 additional miles of gravel and asphalt roads. Surfacing Option B involves the paving or repaving of all 642 miles of gravel and asphalt roads listed in Surfacing Option A.

Direct manpower for construction, assembly and checkout, and operation of the system will peak during 1986 when an average of nearly 1,600 persons will be required. In 1991, following deployment, the remaining increased operational workforce at F.E. Warren AFB will consist of about 475 persons. Table 1.1-1 presents the average annual workforce, based on quarterly estimates for each year of construction.

Table 1.1-2 shows the average number of jobs including those which are considered to be filled by available labor; as well as those filled by weekly commuters and inmigrants, on an annual average basis. In general, locally available labor will fill all the road and construction jobs.

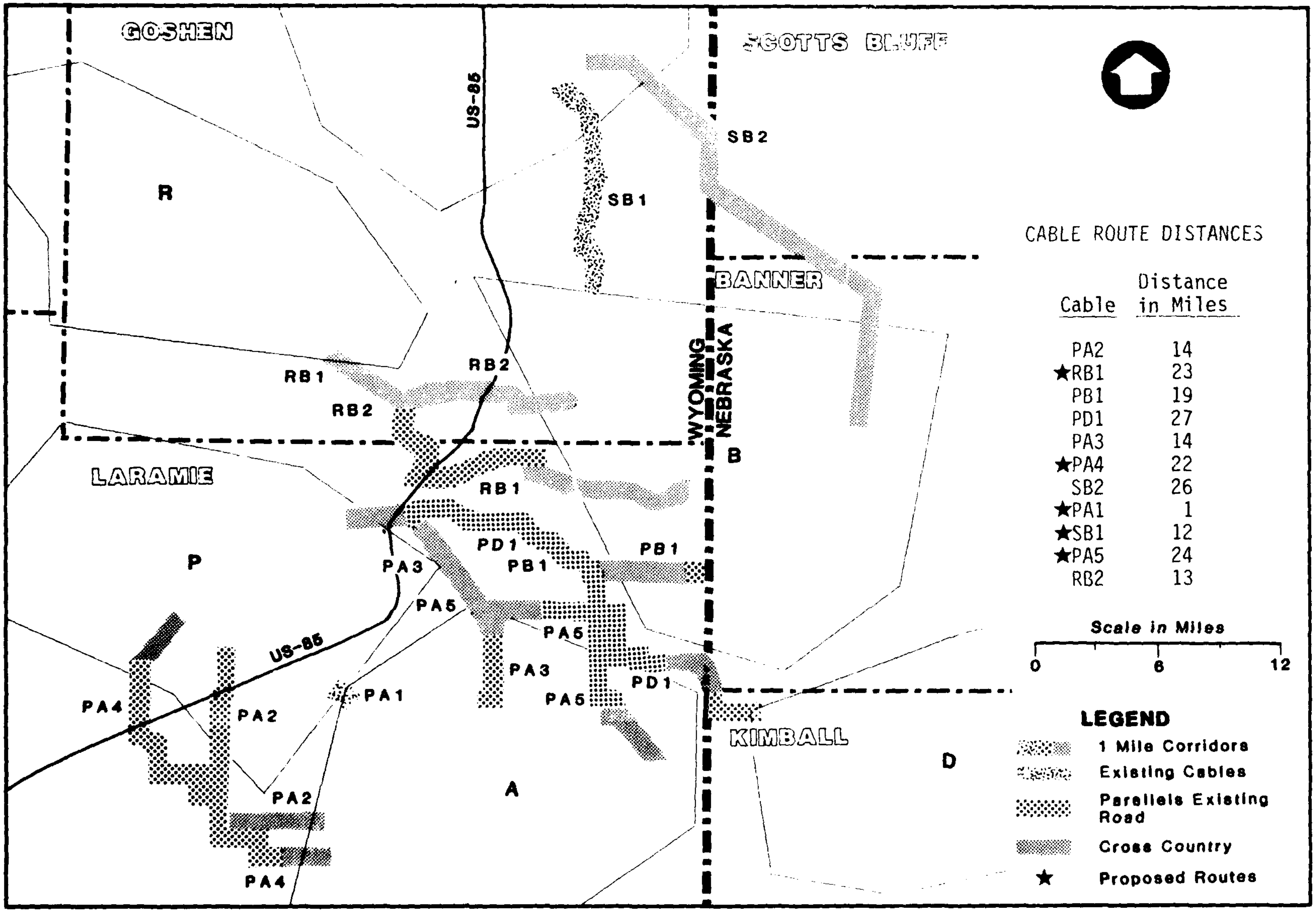


FIGURE 1.1-5 ALTERNATIVE CABLE ROUTES

Table 1.1-1

PROJECT AVERAGE MANPOWER REQUIREMENTS BY YEAR[1]

	1984	1985	1986	1987	1988	1989	1990	1991
Deployment Area								
Construction	5	40	60	60	40	0	0	0
Assembly and Checkout	0	15	210	285	265	265	10	0
Operations	0	0	0	0	0	0	0	0
Defense Access Road	0	275	315	150	0	0	0	0
Subtotal	5	330	585	495	305	265	10	0
Operating Base								
Construction	100	630	70	0	0	0	0	0
Assembly and Checkout	40	130	525	555	515	510	22	0
Operations	0	130	415	490	500	500	475	475
Subtotal	140	890	1,010	1,045	1,015	1,010	497	475
TOTAL:	145	1,220	1,595	1,540	1,320	1,275	507	475

Note: [1] Estimates based on average quarterly employment.

Table 1.1-2

TOTAL JOBS, LOCAL AND REGIONAL HIRES, AND INMIGRATION FOR THE EMPLOYMENT DEMAND REGION OF INFLUENCE

	1984	1985	1986	1987	1988	1989	1990	1991 and beyond
1) Total (Direct/Indirect) Additional Jobs	250	2,400	2,675	2,550	2,025	1,825	650	590
2) Average Annual Local Hires	157	1,750	1,525	1,350	1,100	815	225	230
3) Average Annual Weekly Commuters	25	225	175	100	25	10	0	0
4) Average Annual Inmigrant Workers	75	425	950	1,100	925	1,000	425	360
5) Unsuccessful Job-Seekers	30	185	180	150	165	110	70	0
6) Inmigrant[1] Population	275	1,475	2,875	3,200	3,025	2,875	1,200	925

Note: [1] Includes inmigrants, workers, and unsuccessful job-seekers.

As a result of the purchase of materials in the project area and the local expenditures of project employees, additional jobs will be created in the region. These jobs are estimated to number as follows:

Year:	1984	1985	1986	1987	1988	1989	1990	1991 & on
Indirect Jobs:	105	1,180	1,080	1,010	705	550	143	115

Estimated materials and costs for the project, based on total project budgetary considerations, are shown by Standard Industrial Classification in Table 1.1-3.

A number of construction and support materials will be obtained from sources within the project area. Among the materials exerting a major influence on assessment of project impacts are aggregate (4.6 million tons), water (516 acre-feet), fuel (7.6 million gallons), and electricity (3.8 million kWh). In the case of water supply for construction, the Air Force will identify and, if necessary, obtain permits for the water or purchase existing water rights.

1.2 Description of Resources

The study of transportation includes the various modes of travel used for the safe and efficient movement of persons and goods. Its focus includes transportation planning, and the design and operation of roads, railroads, aviation facilities, public transit, and pedestrian and bicycle facilities, as well as the interrelationships between these travel modes.

The project will generate additional travel demand, especially in the Cheyenne area. Extensive analysis was performed to evaluate the effects of this demand.

Of particular importance is the study of the roads to be used by the stage transporter vehicle and other project-related traffic, and the evaluation of necessary roadway improvements. This system includes those roads used for transporting missile components to the selected missile Launch Facilities.

Table 1.1-3

ESTIMATED MATERIAL REQUIREMENTS
BY STANDARD INDUSTRIAL CLASSIFICATION

Industrial Classification	Estimated 1982 Dollars (1,000s)
Fabricated Structural Metal	$22,999
Unclassified Professional Services and Products	14,358
Cement and Concrete Products	10,862
General Wholesale Trade	8,890
Structural Metal Products[1]	11,983
Millwork, Plywood, and Wood Products[1]	3,941
Copper, Copper Products	3,902
Electrical Lighting and Wiring	3,871
Stone and Clay Mining and Quarrying	39,728
Stone and Clay Products[1]	2,955
Basic Steel Products	1,233
Heating and Air Conditioning Apparatus	1,525
Plumbing and Plumbing Fixtures	938
Petroleum Refining and Products	5,148
Material Handling Equipment	1,970
Sawmills and Planing Mills	1,478
Paints and Allied Products	1,478
Plastic Products[1]	1,478
Furniture and Fixtures	986
Structural Clay Products	986
General Hardware	986
Scientific Instruments	986
Rail Transport	986
Real Estate	986
Construction, Mining, and Oilfield Machinery	749
TOTAL:	$145,402

Note: [1] Not included in other Industrial Classifications.

2.0

AFFECTED ENVIRONMENT

2.0 AFFECTED ENVIRONMENT

2.1 General

The area analyzed by the transportation resource is primarily rural with Cheyenne as the prominent population center. Interstate 25, Interstate 80, and a network of state and county roads provide good access to the region. Major rail lines serve the area with an important rail yard located in Cheyenne. Cheyenne Airport is the key aviation facility in the region in addition to the Denver airport hub. A number of general aviation airports are also located throughout the region. Public transit, although not a major system, is available in Cheyenne. Intercity bus service in the region primarily utilizes the Interstate highway system. Bicycle and pedestrian facilities are available in the population centers.

2.2 Project Requirements

Overall project requirements are outlined in Section 1.1. Requirements specific to the transportation resource are as follows.

In addition to the road, cable, and staging alternatives addressed in the previous section, alternate routes to by-pass a low clearance railroad bridge in Kimball, Nebraska are discussed in this report.

The stage transporter (S/T) has a vertical height of 14 feet-8 inches with a safety requirement for an additional 6 inches.

The Kimball railroad bridge over Nebraska State Highway 71 presently has a clearance of only 13 feet-6 inches. Several alternate routes exist to preclude the necessity of substantial and impractical changes to the existing railroad overpass. These include:

- o Use the existing county road in Banner County between Launch Facility (LF) B-5 and Route 71.
- o Use the existing county road in Banner County between Launch Facilities (LFs) B-6, D-2, and Route 71.
- o Use the existing county road 2 miles west of Route 71 on Route 30 across an existing railroad at-grade and proceed 1 mile north, then 2 miles east to Route 71. This will require improvement of the at-grade railroad crossing. This is the Proposed Action.

2.3 Regions of Influence

2.3.1 Definition

The geographical limits of the Region of Influence (ROI) for transportation include Laramie, Goshen, and Platte counties in Wyoming; Kimball, Banner, and Scotts Bluff counties in Nebraska; and a corridor along Interstate 25 and adjacent rail lines in Colorado which encompasses Fort Collins, Greeley, and Denver (*Figure* 2.3.1-1). The ROI includes construction sites directly disturbed by the project, particularly the work at F.E. Warren Air Force Base (AFB), LFs, access roads, and the cable connections between missile flights.

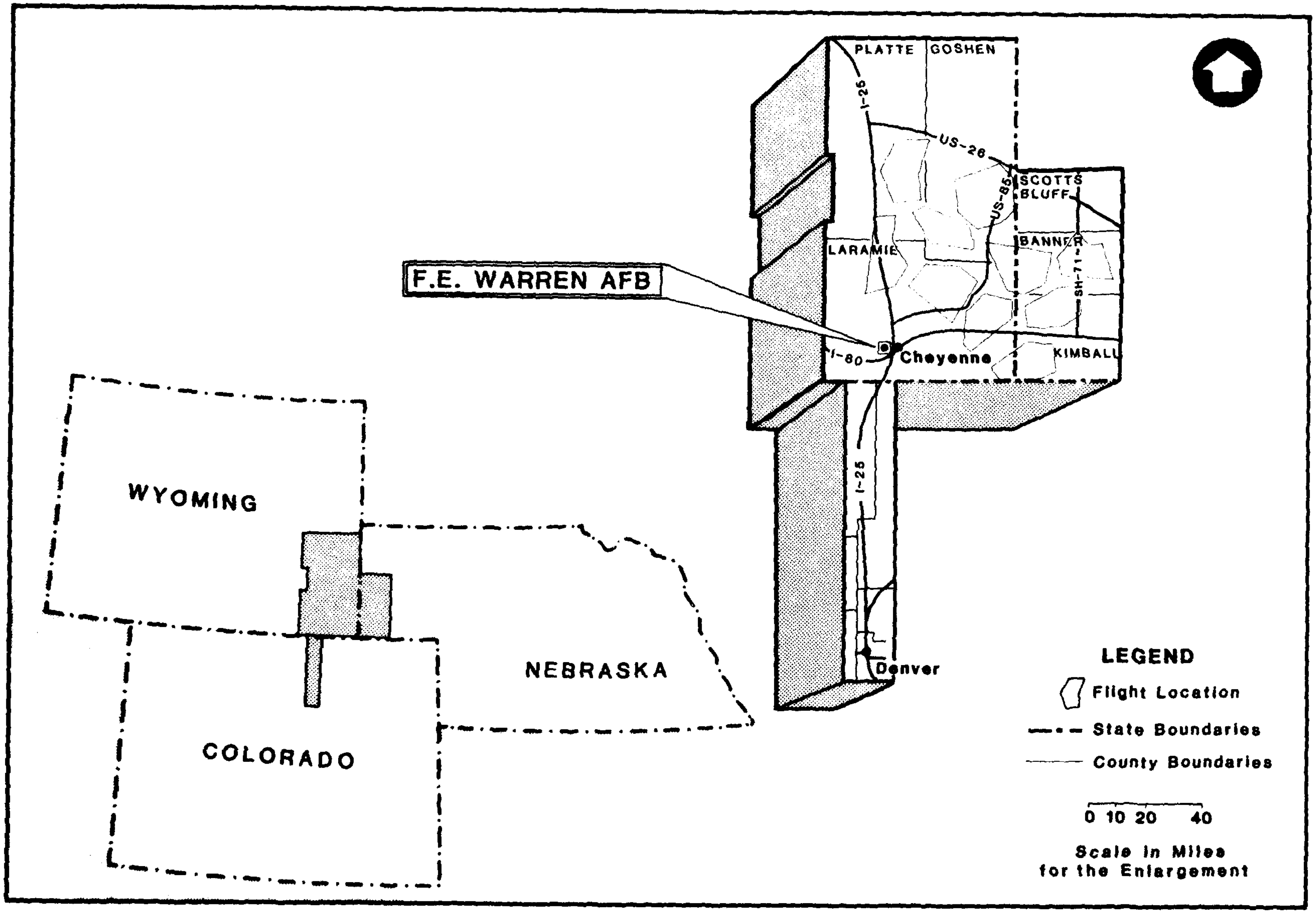


FIGURE 2.3.1-1 REGION OF INFLUENCE FOR TRANSPORTATION

The Area of Concentrated Study (ACS) is defined as an area approximately bounded by Interstate 25, U.S. 26, Nebraska State Highway 71, Interstate 80, and portions of Kimball County, Nebraska, and Laramie County, Wyoming, south of Interstate 80.

2.3.2 Justification

The boundaries of the ROI encompass all major transportation systems affected by major deliveries of materials, and movements of construction workers and vehicles to and from job sites. These include roadways, railroads, aviation, public transit, and pedestrian and bicycle facilities. The ROI also includes transportation systems in areas where inmigrant populations are expected to reside, shop, and use recreational facilities, based on the population allocation model.

A population allocation model determined the areas in which inmigrant populations resulting from the Proposed Action are expected to reside, shop, and use recreational facilities. These areas in turn determine the transportation routes leading to sites and impacted jurisdictions which were chosen for study.

In order to maximize the assessment process, data collection and analysis efforts focused on the ACS within the ROI where impacts were projected to be concentrated. This area was based on the location of F.E. Warren AFB and the 100 LFs. This area also focuses attention on those portions of the ROI where appreciable project-induced population growth is anticipated since transportation systems in these areas would also be more directly affected by the project.

2.4 Derivation of Data Base

This section describes literature sources, group and agency contacts, and primary data collection efforts which formed the data base for this report's profile of existing conditions in the ROI and projection of impacts which would occur under the Proposed Action and No Action Alternative.

Section 2.4.1, Literature Sources, describes published and unpublished materials collected and reviewed by the project team. Governmental agencies and private organizations contacted during the data collection phase are summarized in Section 2.4.2. Section 2.4.3 describes primary data collected in the field to remedy shortfalls in the existing data base.

2.4.1 Literature Sources

For the roads analysis, information concerning previously collected data on traffic volumes and related roadway characteristics in the ROI was provided by the Wyoming Highway Department (WHD), the Nebraska Department of Roads (NDOR), and engineering or planning departments on the county and local levels. These materials included data on the traffic volumes, accident locations, special turning movement counts, traffic signal phasing and timing plans, vehicle classification information, and roadway structural conditions.

Bridge inspection reports prepared by the WHD and the NDOR between 1980 and 1983 provided information on the physical condition of major bridge structures

along S/T routes. Roadway physical inventory information was also provided by the WHD and NDOR.

The Cheyenne-Laramie County Regional Planning Office furnished information concerning the area of the city where potential population growth and housing development would occur. These areas were identified and formed the basis for the allocation of forecasted population growth in the area.

For the railroad analysis, the state rail plans for Wyoming, Nebraska, and Colorado, including their most recent updates, were reviewed. The Wyoming State Public Service Commission provided data on statewide rail shipments originating and terminating in Wyoming. The railroad grade crossing inventory for the State of Wyoming was also reviewed. The Nebraska Public Service Commission and the NDOR provided maps and data on rail operation in Nebraska.

Both the Burlington Northern (BN) and Union Pacific (UP) railroads were contacted. UP furnished plans covering a number of its lines.

For the aviation analysis, a large number of Federal Aviation Administration (FAA) published reports, including the National Airport System Plan, were reviewed. The FAA also supplied Form 5010, summarizing airport operations for all of the studied airports in the study area. FAA personnel in Cheyenne also provided tower counts for the Cheyenne Airport.

State Airport System Plans for Wyoming and Nebraska were reviewed. The Cheyenne Airport Master Plan was also reviewed. Flight fee computations for commercial airlines and traffic counts for general aviation were obtained. Flight schedules for the two principal commercial operators, Frontier Airlines and Rocky Mountain Airways, were reviewed. Master plans were reviewed for the airport in Scottsbluff. Data were also obtained from the airport managers.

For public transit, schedules and plans were obtained from the Cheyenne transit and taxi systems. Schedules were also obtained for the intercity bus lines. Information was also obtained for Avis Rent a Car and Budget Rent-a-Car concerning vehicle rentals.

For the analysis of pedestrian and bicycle facilities, bicycle circulation data and accident data for both pedestrians and bicyclists were collected from the states of Wyoming and Nebraska and the larger cities in the study area. Information on Cheyenne bikeway facilities was reviewed.

2.4.2 Group and Agency Contacts

Governmental agencies and private organizations contacted during the data collection phase of the study included:

o Roads:

1. <u>Federal</u>

   - Federal Highway Administration (FHWA); and
   - U.S. Bureau of Census.

2. <u>State</u>

   - Nebraska Department of Road (NDOR); and
   - Wyoming Highway Department (WHD).

3. <u>County</u>

   - Goshen County, Wyoming;
   - Laramie County, Wyoming;
   - Platte County, Wyoming;
   - Banner County, Nebraska;
   - Kimball County, Nebraska; and
   - Scotts Bluff County, Nebraska.

4. <u>Municipal</u>

   - Albin, Wyoming;
   - Burns, Wyoming;
   - Cheyenne, Wyoming;
   - Chugwater, Wyoming;
   - Fort Laramie, Wyoming;
   - Guernsey, Wyoming;
   - La Grange, Wyoming;
   - Lingle, Wyoming;
   - Pine Bluffs, Wyoming;
   - Torrington, Wyoming;
   - Wheatland, Wyoming;
   - Yoder, Wyoming;

- Bushnell, Nebraska;
- Gering, Nebraska;
- Kimball, Nebraska;
- Lyman, Nebraska;
- Mitchell, Nebraska;
- Morrill, Nebraska;
- Scottsbluff, Nebraska; and
- Terrytown, Nebraska.

Railroads:

State Regulatory and Planning

- Nebraska Department of Roads (NDOR);
- Nebraska Public Service Commission; and
- Wyoming Public Service Commission.

Private

- Burlington Northern (BN);
- Chicago and North Western Railroad (C&NW); and
- Union Pacific (UP).

Aviation:

Federal

- FAA.

State

- Nebraska Aeronautics Commission; and
- Wyoming Aeronautics Commission.

County

- Scotts Bluff County Airport.

Municipal

- Cheyenne Municipal Airport; and
- Kimball Municipal Airport.

Public Transit:

Public

- Laramie County, Wyoming, School District No. 1.

Private

- Avis Rent A Car;
- Budget Rent-A-Car of Cheyenne;
- Checker - Yellow Cab Company, Inc., Cheyenne, Wyoming;
- Greyhound Lines, Inc.;
- Jitney, Inc., Cheyenne, Wyoming; and
- Trailways, Inc.

Other:

- University of Wyoming, Laramie Campus.

2.4.3 Primary Data

In order to properly assess the project's impacts, it was necessary to collect a substantial amount of data. For example, an inventory of the roads to be used by the S/T vehicles was performed. This involved extensive data collection on roadway characteristics. An inventory of project-related rural roads was also performed.

Data gathered in these inventories were used to determine the suitability of the existing routes for use by the S/T vehicle and to determine the need for improvements.

The WHD collected traffic volume data at the Interstate 25 at Randall Avenue interchange and at the intersections of Central Avenue at Yellowstone Avenue and Yellowstone Avenue at Prairie Boulevard. Similarly, the City of Cheyenne collected special traffic volume count data at the Randall Avenue/Pershing Boulevard intersection.

The NDOR collected traffic volume data at 36 locations in Kimball and Banner counties.

Extensive information concerning traffic, roadway, and land use information at F.E. Warren AFB was collected. Assistance in traffic data collection was provided by the WHD. Roadway alignments at F.E. Warren AFB were studied in detail.

Vehicle classification data on project-related routes was obtained from WHD and NDOR and further data was collected through traffic classification counts at 3 urban and 15 rural locations within the ROI.

For railroads, field surveys were conducted along some sections of railroad lines and rail sidings.

2.5 Analytic Methods for Existing Conditions

2.5.1 Roads

This section describes analytic methods employed during the data collection phase of this study (described in Section 2.4) in order to develop a profile of existing roadway conditions in the ROI for the base year, 1983.

The methodology for characterizing road and traffic conditions both in the vicinity of population centers and in rural areas is described according to travel demand, traffic engineering, and physical condition of roadways.

2.5.1.1 Population Centers

2.5.1.1.1 Travel Demand

For population centers, travel demand was assessed through the use of manual study techniques and computerized transportation models. Manual study techniques, which include the estimation of current traffic volumes, a review of historic traffic growth, and an understanding of local development trends, were used in the analysis of travel demand for smaller population centers.

The model approach was used to simulate traffic conditions in the Cheyenne Urban Area. Transportation models provide a convenient means of simulating complex traffic patterns and allow a determination of roadway links where capacity deficiencies may occur. The Travel Demand Forecasting Model is described in Appendix A.

The procedures outlined in the National Cooperative Highway Research Program (NCHRP) Report 187, Quick-Response Urban Travel Estimation Techniques and Transferable Parameters, were followed for the travel demand modeling process for the Cheyenne area. This step-by-step process begins with the calculation of zonal trip generation and trip distribution (based on various land use scenarios), a mode choice analysis, and an auto occupancy analysis. When these steps are completed, the daily traffic is assigned to alternative roadway networks and the final step of capacity analysis can be completed. Peak hourly factors can be applied in order to obtain an hourly traffic assignment.

The trip distribution, mode split, and traffic assignment steps were performed with MicroTRIPS, a set of transportation planning programs developed by PRC Voorhees, Inc., for use on a microcomputer. These programs utilize the gravity model to determine the distribution of trips between areas and apply capacity restraint to the network assignment process. The number of trips that are generated by a given area is determined by the area's socioeconomic characteristics. Therefore, the Cheyenne area was divided into geographic zones with each zone representing an area of homogeneous land use (i.e., an

area of similar trip generators). The U.S. Bureau of Census system of tracts and block groupings was condensed into a system of traffic analysis zones that meet this criterion. Figures 2.5.1-1 and 2.5.1-2 (foldout map in back of volume) show the geographic boundaries of the traffic zones for the Cheyenne area.

The total number of trips generated by a zone is the sum of the trips produced and the trips attracted. The number of trips produced is determined by the number of households, the number of automobiles per household, and the average income of the households. These data were obtained from the U.S. Bureau of Census. The number of trips attracted is determined by the number of retail and nonretail employees and the number households. Employment data were obtained from Dun's Marketing Services. The trip production and attraction rates for home based work (HBW) trips, home based nonwork (HBNW) trips, and nonhome based (NHB) trips provided in NCHRP 187 were then used to calculate the number of productions and attractions per zone. Next, areawide control factors, as provided in NCHRP 187, were applied to balance the total number of productions and attractions for the Cheyenne area.

The gravity model was then applied in order to distribute productions and attractions from each particular zone to other zones in the study areas. Guidelines included in NCHRP 187 were followed in order to generate travel times and corresponding friction factors between zones. The average speed values inherent in determining the travel time (NCHRP 187, Table 5) were assigned to the appropriate roadway facilities and a traffic assignment was performed, resulting in a table of costs (travel times) between all zones. These costs were then assigned friction factors as shown in NCHRP 187, Figures 7 through 12, for the 3 trip purposes. The production and attraction tables were factored to account for average auto occupancy and mode split, which resulted in a production and attraction table in vehicle-trips for each purpose. The tables were then transformed into origin/destination tables (O/D tables) and summed to produce a trip table.

External-to-external volumes were then added to the O/D table to account for traffic that only passes through the study area. These trips primarily occur on Interstate 25 and Interstate 80.

The O/D table was assigned to the roadway network by an iterative "capacity restraint" model, which simulated the effects of congestion by reducing the average speed of a roadway link based on its volume/capacity ratio. Thus, if a roadway section is heavily utilized in a particular iteration, the average speed for the section will be reduced in the next iteration, which may result in motorists choosing an alternative path of travel. In this analysis, five iterations were necessary to complete each traffic assignment. The end product of the traffic assignment process is the development of traffic volumes on the road network. These volumes form the basis for traffic engineering analysis.

2.5.1.1.2 Traffic Engineering

The study network consists of urban and rural roadways classified as the Interstate system, principal arterials, minor arterials, important collectors and local roads, intersections, and the accesses and roadways for F.E. Warren AFB.

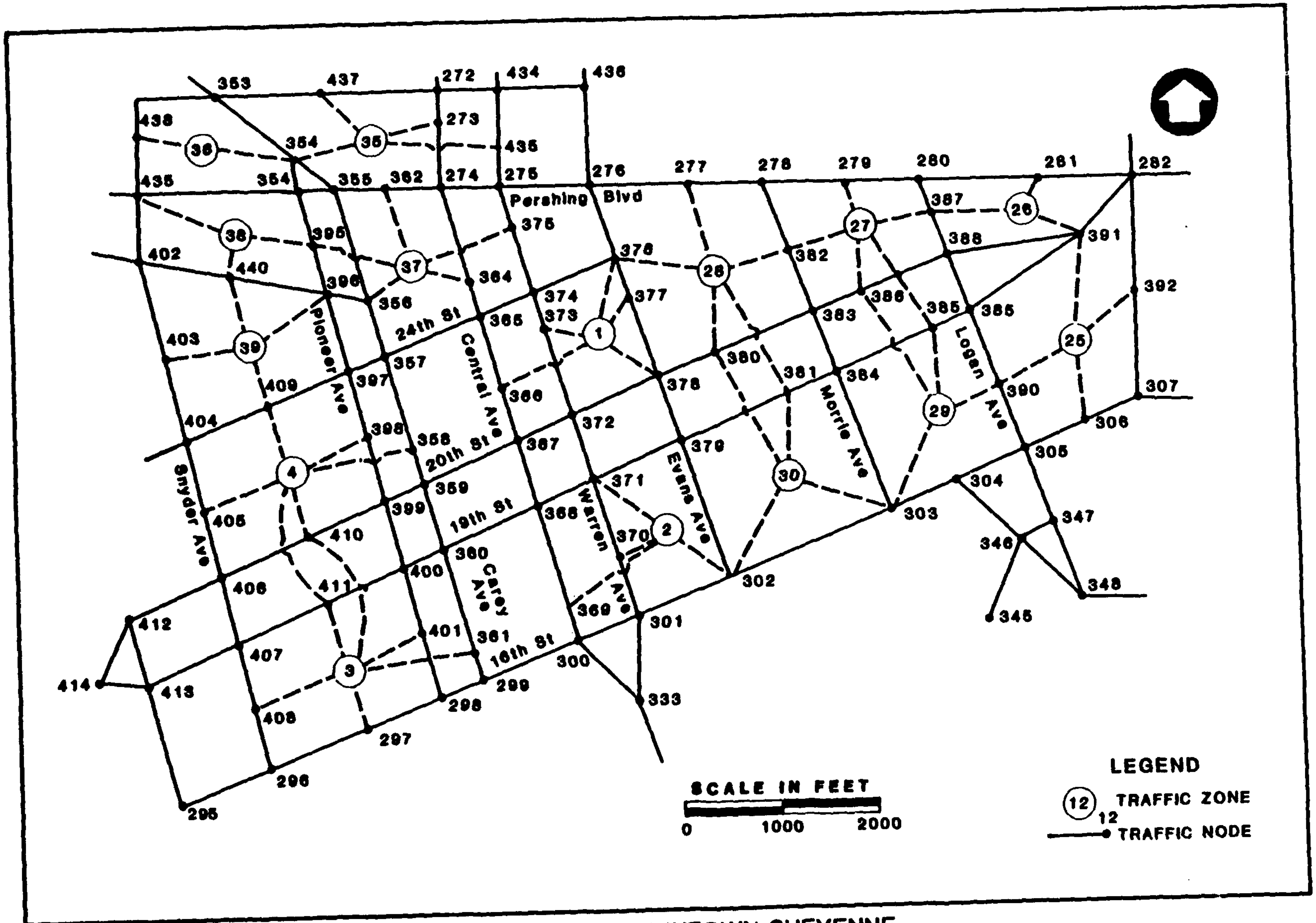


FIGURE 2.5.1-1 TRAFFIC ZONES AND NODES IN DOWNTOWN CHEYENNE

Capacity, queuing, and delay analyses were performed for traffic conditions for the roadway study network for the current year, 1983.

An analysis was made of the road system in the City of Cheyenne; the road system in other population centers was also evaluated.

2.5.1.1.2.1 Capacity Analysis

Capacity is defined as the maximum number of vehicles passing over a given section of roadway during a given time period under prevailing conditions. Peak-hour periods in urban areas and the 30th highest hour in smaller population centers are normally considered as the unit of time for capacity analysis. The capacity of a section of roadway was estimated for various levels of service (LOS). LOS, which is a qualitative measure of traffic flow, is designated A through F and described in Table 2.5.1-1.

Analysis for signalized intersection locations in Cheyenne, Wyoming was accomplished using the Intersection Capacity Analysis Program (ICAP) for the 1983 existing conditions, 1985 No Action, 1985 Proposed Action, and 1990 No Action and Proposed Action. ICAP is a set of programs which perform intersection capacity analysis in accordance with the definitions and procedures of Transportation Research Board (TRB) Special Report No. 87 and the Highway Capacity Manual. It was developed by the Institute of Transportation and Traffic Engineering of the University of California in cooperation with the Automotive Safety Foundation. The program which calculates approach capacity is divided into four major parts depending upon the parameter to be determined: service volume, approach width, load factor, or green to cycle (G/C) ratio. Using the known approach widths, G/C ratios, and projected approach volumes for the four conditions, the program will calculate the load factor value.

Initially, the peak-hour factor, metropolitan area size, location in metropolitan area, right turn, left turn, and bus factors were determined. Load factors were then determined.

LOS designations were manually added using Table 10.13 of the 1965 Highway Capacity Manual as a guideline. Load factors were adjusted to approximate conditions under interconnected signal operation where necessary.

Capacity analyses were also performed for assumed signalized diamond interchanges at the Interstate 25 and Randall Avenue, College Drive, and Central Avenue interchanges. Analyses were performed using the PASSER II-80 computer program which was developed by the Texas Transportation Institute, a part of Texas A&M University.

Table 2.5.1-1

TRAFFIC LEVEL OF SERVICE

Service	Description
A	Free flow with low volumes and high speeds.
B	Stable flow with operating speeds beginning to be restricted somewhat by traffic conditions.
C	Stable flow, but speeds and maneuverability are more closely controlled by high volumes.
D	Approaches unstable flow with tolerable operating speeds being maintained though considerably affected by changes in operating conditions.
E	Unstable flow with speeds lower than in level "D" and volumes at or near maximum possible capacity. Possible stoppages of momentary duration.
F	Forced flow with low speeds and volume below maximum capacity resulting from queues of vehicles backing up from a restriction downstream. Possible stoppages for short or long periods of time.

Source: Highway Capacity Manual, 1965.

PASSER was designed as an engineering tool to calculate green timings as well as to phase sequence and offsets for signalized intersections along an arterial. The solutions produced maximize through bands to provide good arterial progression for a given set of traffic flow conditions. The program's theory of operation is presented in the "Highway Research Record No. 445". PASSER II-80 was enhanced to include output calculation results for LOS, delay, and probability of queue clearance. Capacity analysis is based on the 1965 Highway Capacity Manual. Delay analysis used the Highway Capacity Manual Interim Guidelines-January 1980, to relate LOS to delay.

Program runs were made for AM and PM peak-hour periods for 1985 No Action and 1985 Proposed Action.

2.5.1.1.2.2 Queuing and Delay Analysis

Further queuing and delay studies were performed at the approaches to F.E. Warren AFB. Queue studies were performed for the approaches to F.E. Warren AFB at Gate No. 1 (Randall Avenue) and Gate No. 2 (Missile Drive) during the morning peak hour (7:00 AM to 8:00 AM) for inbound (westbound) traffic. A queue is defined as the number of vehicles that are stopped on a section of roadway. The "Manual Method," as described in the U.S. Department of Transportation's (DOT's) Highway Safety Engineering Studies Procedural Guide, was utilized. This method provides a determination of base year (1983) maximum and average queue length.

Delay studies were performed for the approach to F.E. Warren AFB at Gate No. 1 (Randall Avenue) and Gate No. 2 (Missile Drive) during the morning peak hour (7:00 to 8:00 AM) for inbound (westbound) traffic and evening peak hour (4:00 AM to 5:00 PM) for outbound (eastbound) traffic. The "Sampling Method" for intersection delay, as described in DOT's Highway Safety Engineering Studies Procedural Guide, was utilized. This method provides a determination of base year (1983) total delay, average delay per stopped vehicle, average delay per approach vehicle, and percent of vehicles stopped.

2.5.1.1.2.3 Safety Analysis

The roadway network was also analyzed from a safety standpoint for vehicles, bicyclists, and pedestrians. Accident data were collected for 1980, 1981, and 1982. Information on collision diagrams was obtained for major intersections and high accident locations. All accidents were summarized in tabular form by the frequency of accident. All major intersections in high accident locations were analyzed to determine the factor or factors causing the accidents. Roadway design features and the traffic control devices were studied for possible improvements.

2.5.1.1.3 Physical Conditions

For the purpose of analyzing their physical conditions, the S/T roads were considered to comprise the presently designated Minuteman transporter/erector (T/E) routes. Only a small proportion of the total mileage of T/E routes falls within the population centers covered by the study. Data on the existing physical conditions of roads in population centers were gathered at the same time using the analytic methods as described in more detail in Section 2.5.1.2.3.

2.5.1.1.4 Vehicle Classification Counts

City streets within Cheyenne will be utilized as trucking routes during the construction phase of the project, particularly for the transportation of transit-mix concrete to F.E. Warren AFB. Locations of concrete companies and likely haulage routes within Cheyenne from the concrete companies to F.E. Warren AFB are shown in Table 2.5.1-2. The table also depicts type of road surface and condition for the streets and roads to be used as haul routes between the companies and F.E. Warren AFB.

In order to determine baseline 1983 truck traffic on these routes, three 12-hour vehicle classification counts were undertaken in Cheyenne. The 24-hour average daily traffic (ADT) was developed by factoring the 12-hour counts.

Table 2.5.1-2

TRANSIT-MIX CONCRETE HAUL ROUTES IN CHEYENNE
DESCRIBING ROUTE FROM COMPANY TO F.E. WARREN AFB

Company and Travel Route	Route Conditions		
	Miles	Surface Type	Surface Conditions
1. Cook-McCann Concrete, Inc. 819 East 15th Street Take W. Lincolnway to Missile Drive, enter AFB at Missile Drive	1.206 1.415	G2 J	2/3 1/2
2. Morandin Concrete 1201 West 22nd Street Take 19th Street to Missile Drive, enter AFB at Missile Drive	0.210 1.004	G2 J	3 1/2
3. Teton Construction 4819 South Industrial Service Road Take Industrial Service Road to I-80 (west), to I-25 (north), enter AFB at Missile Drive	0.795 6.798	G2 J	2 2
4. James E. Simon Construction 1807 East Fox Farm Road Take Fox Farm east to Walter-scheid, north to Deming, to W. Lincolnway, to Missile Drive, enter AFB at Missile Drive	2.987 1.490	G2 J	2/3 2
5. DeBernardi and Sons 5009 South Greeley Highway Take U.S. 85 to I-80 (west), to I-25 (north), enter AFB at Missile Drive	3.082 4.808	G2 J	2 2
Take U.S. 85 to Deming, W. Lincolnway to Missile Drive, enter AFB at Missile Drive	4.391 1.927	G2 J	2/3/4 1/2

Notes: 1 *Description of surface type:*
G2 - High type mixed bituminous
J - Portland cement concrete road

2 Surface conditions:
1 Smooth surface, no cracks or potholes
2 Only surface cracks in concrete
3 Surface cracks in concrete, small potholes
4 Many cracks in concrete; larger, more numerous potholes

2.5.1.2 Rural Areas

2.5.1.2.1 Travel Demand

The roadway network in applicable rural areas interconnecting the population centers consists of the Interstate system, state highways, county roads, and Department of Defense (DoD) roads. The rural road system selected for detailed study consisted of those routes that may be affected by the project. These routes included all presently designated Minuteman T/E routes, potential aggregate haul routes, and applicable rural roads functionally classified as collectors and arterials.

Traffic volume data were obtained from the states of Wyoming and Nebraska. These counts consisted of data from permanent automatic traffic recorders (ATRs) and short-term counts. In addition, NDOR collected 48-hour counts at several key locations in the rural areas. The data obtained were plotted on a map. The data were then rounded and used as 1983 ADT volumes.

2.5.1.2.2 Traffic Engineering

Capacity analysis and determination of LOS were performed for critical roadways including Interstates 25 and 80, U.S. 26 and U.S. 85, State Highway 71, and other major roadways.

The rural roadway network was also analyzed from a safety standpoint. Accident data were collected for 1980, 1981, and 1982 from the states of Wyoming and Nebraska; these were analyzed to determine the factor or factors causing the accidents.

2.5.1.2.3 Physical Conditions

The S/T vehicle has a gross weight of approximately 220,000 pounds and axle loads of 30,000 pounds. Of primary concern is the ability of the roadways to accommodate this vehicle. During the 1960s, Minuteman T/E routes were designated and public roads were upgraded through the Defense Access Roads (DAR) program. When new roads were needed to connect the public road system to the launch facilities, a Department of Defense road was built by the U.S. Army Corps of Engineers.

To assess the physical condition of roads that would be utilized by the S/T vehicle, a comprehensive road condition inventory was conducted on presently designated Minuteman T/E routes. It was assumed that the S/T vehicle would use existing T/E routes to the maximum extent possible. Data gathered during this inventory included roadway surface type, surface width, shoulder width, number of lanes, and structural properties. In addition, information was gathered on structures such as bridges, culverts, and cattle guards, as well as potential obstructions such as rail crossings, utility crossings, and substandard horizontal and vertical curves. A computerized procedure was used to summarize both roadway and structure information and to store a detailed record of the physical condition of the affected roads. The same inventory procedures were utilized for other project-related roads.

A route numbering system was developed for the inventory in order to catalog the information. Major sections of roadways were given link numbers.

Figure 2.5.1-3 (foldout at the end of this volume) shows the T/E routes and additional project-related roads with their assigned link numbers.

During the inventory, roadway and shoulder surface types were classified using the Wyoming State Classification System. This system is very similar to both the Nebraska and Federal system. The surface classes are described in Table 2.5.1-3.

In order to determine the structural properties of the roadways, a Clegg Impact Device was used on relevant surface classes. Clegg impact values (CIV) may be readily correlated with California Bearing Ratio (CBR) or used as a structural index in their own right.

In addition, information was gathered for structures such as bridges, culverts and cattle guards, and potential obstructions such as rail crossings, utility crossings, and substandard horizontal and vertical curves. Structural measurements that were recorded included bridge spans, bridge clearances, and size and amount of cover for culverts.

A computerized procedure was used to summarize both roadway and structure information and store a detailed record of the physical conditions of the affected roads.

A review of bridge structures was made independently of the road inventory. Copies of the Structure Inventory and Appraisal (SIA) sheets for T/E routes were obtained from the Wyoming Highway Department and the Nebraska Department of Roads. This information did not include a complete record of types and locations of minor structures with span lengths less than 20 feet. Minor structure information was therefore obtained during the road inventory.

An inventory of major structures was developed including structure number, inspection date, mile post, structure type, span length, and inspection comments. The sufficiency ratings and field inspection condition appraisals were also reviewed.

Based on the extensive road improvements that may be required for the T/E routes, it is anticipated that large quantities of aggregate material may be necessary. Therefore a detailed study was made to determine probable aggregate sources and likely haul routes.

Table 2.5.1-3

WYOMING STATE CLASSIFICATION SYSTEM
SURFACE CLASS DEFINITIONS

Surface Class	
C	<u>Graded and Drained Earth Road</u> - A road of natural earth aligned to permit reasonable convenient use by motor vehicles and drained sufficiently by longitudinal and transverse drainage systems, natural or artificial, to prevent serious impairment of the road by surface water.
D	<u>Soil Surface Road</u> - A road of natural soil, the surface of which has been treated for purposes of stabilization by the addition of a course of mixed soil, such as sand-clay, soft shale, or top soil, or an admixture such as bituminous material, portland cement, calcium chloride, sodium chloride, or fine granular material (sand or similar material).
E	<u>Gravel or Stone Road</u> - A road with a wearing surface which consists of gravel, broken stone, slag chert, caliche, iron ore, shale, chats, disintegrated rock, or granite, or other similar fragment material (coarser than sand).
E-1	<u>Not Graded and Drained</u> - A road of the type described above but having little or no grading or drainage, not built to engineering standards, and considered to be less than would qualify for the designation "Graded and Drained."
E-2	<u>Graded and Drained</u> - A road of the type described above and possessing qualities of alignment, grading, and drainage at least equal to those described under "C."
G	<u>Mixed Bituminous Road</u> - A road of which the wearing course is 1 inch or more in compacted thickness, composed of gravel, stone, sand, or similar material mixed with bituminous material under partial control as to grading and proportions.
G-1	<u>Low Type</u> - A mixed bituminous road as described above, the base course of which is a nonrigid type and the combined thickness of surface and base is less than 7 inches.
G-2	<u>Paved or High Type</u> - A mixed bituminous road as described above, the base course of which is a rigid type of any thickness or a nonrigid type of such thickness that the total depth of surface and base is 7 inches or more in compacted thickness.
H	<u>Bituminous Penetration Road</u> - A road of which the wearing course is 1 inch or more in compacted thickness composed of gravel, stone, sand, or similar material bound with bituminous material introduced by downward or upward penetration.

H-1 Low Type - A bituminous penetration road, the base course of which is of other than type J, and the combined compacted thickness of surface and base is less than 7 inches, or the design is such as to produce a road having a characteristically low or nonuniform load-bearing capacity.

H-2 High Type - A bituminous penetration road on any base of type J, also on any other type of base where the combined compacted thickness of surface and base is 7 inches or more, or where, by reason of the presence of natural foundation materials which meet base requirements, the road has a characteristically high uniform load-bearing capacity.

I Bituminous Concrete Road - A road on which has been constructed a surface course 1 inch or more in compacted thickness consisting of bituminous concrete or sheet asphalt, prepared in accordance with precise specifications controlling gradation, proportions and consistency of composition, or of rock asphalt. The surface course may consist of combinations of two or more layers such as a bottom and a top course, or a binder and a wearing course.

J Portland Cement Concrete Road - A road consisting of portland cement concrete, with or without a bituminous wearing surface less than 1 inch in compacted thickness.

2.5.1.3 Truck Traffic on Rural Roads

Interstate, state and county roads within the ROI will be impacted both in the construction and operational phases of the project. In order to determine the baseline traffic on these roads, particularly truck traffic, WHD and NDOR 1982 traffic classification counts were obtained and this data was supplemented by 15 further traffic classification counts carried out during November 1983 in the rural areas of the counties of Platte, Goshen, Laramie, Kimball, and Banner.

The supplemental counts were located at intersections wherever possible to maximize their utility. Counts were made on certain project-related roads which have been proposed for upgrading to a paved surface as part of the DAR program. These links included numbers 137, 154, and 129. The counts taken were converted to an ADT figure using factoring procedures.

2.5.2 Railroads

Based on discussion with railroad officials and available information an evaluation of the railroad system was performed to determine its physical condition and rail yard capacity. Capacity constraints on the rail lines were reviewed as were operating and regulatory restrictions.

2.5.3 Aviation

Using general procedures and criteria recommended by the FAA and the results of the capacity analysis in the various airport master plans, a preliminary evaluation of the demand and capacity of the existing facilities at area airports was determined. The facilities evaluated included runways, taxiways, terminals, cargo handling, and parking.

Runway analysis included an inventory of runway lengths, widths, structural capacity, and the condition of pavements. Land-side facilities such as passenger terminals, parking, and freight handling were analyzed based on an inventory of facility uses, capacity, condition, and the availability for expansion.

2.5.4 Public Transit

An analysis was performed of existing and planned bus and taxi service in the Cheyenne area. This included information on extent of service areas, frequency of service, ridership, and potential for expansion. Car rental agencies were also contacted concerning the effects of the project.

2.5.5 Pedestrian and Bicycle Facilities

The Cheyenne bikeway plan was reviewed as well as other existing information including: A Park and Recreation Facilities Master Plan for Greater Cheyenne prepared by the Cheyenne - Laramie County Regional Planning Office; the Cheyenne Bikeway System Master Plan and Construction Documents; and Planning and Development of Bikeway Systems.

2.6 Existing Environmental Conditions

2.6.1 Roads

The ROI is served by a network of national, state, and local roads as shown in Figure 2.6.1-1, Regional Highways. The region is traversed by two routes of the National System of Interstate and Defense Highways. Interstate 25 serves north-south traffic movement, while Interstate 80 serves the east-west movement within and through the region. These traffic arteries are augmented east-west by U.S. 26 and U.S. 30 and north-south by U.S. 85 as well as by several state highways and county roads to serve population centers and rural areas of the ROI.

The roads in this network have been functionally classified according to the character of service they provide. This functional classification is determined by the level and nature of travel service provided by a given road and its role in providing access to adjacent areas. All roads are classified according to three basic functional classifications: arterial, collector, and local. These classifications are defined in Table 2.6.1-1.

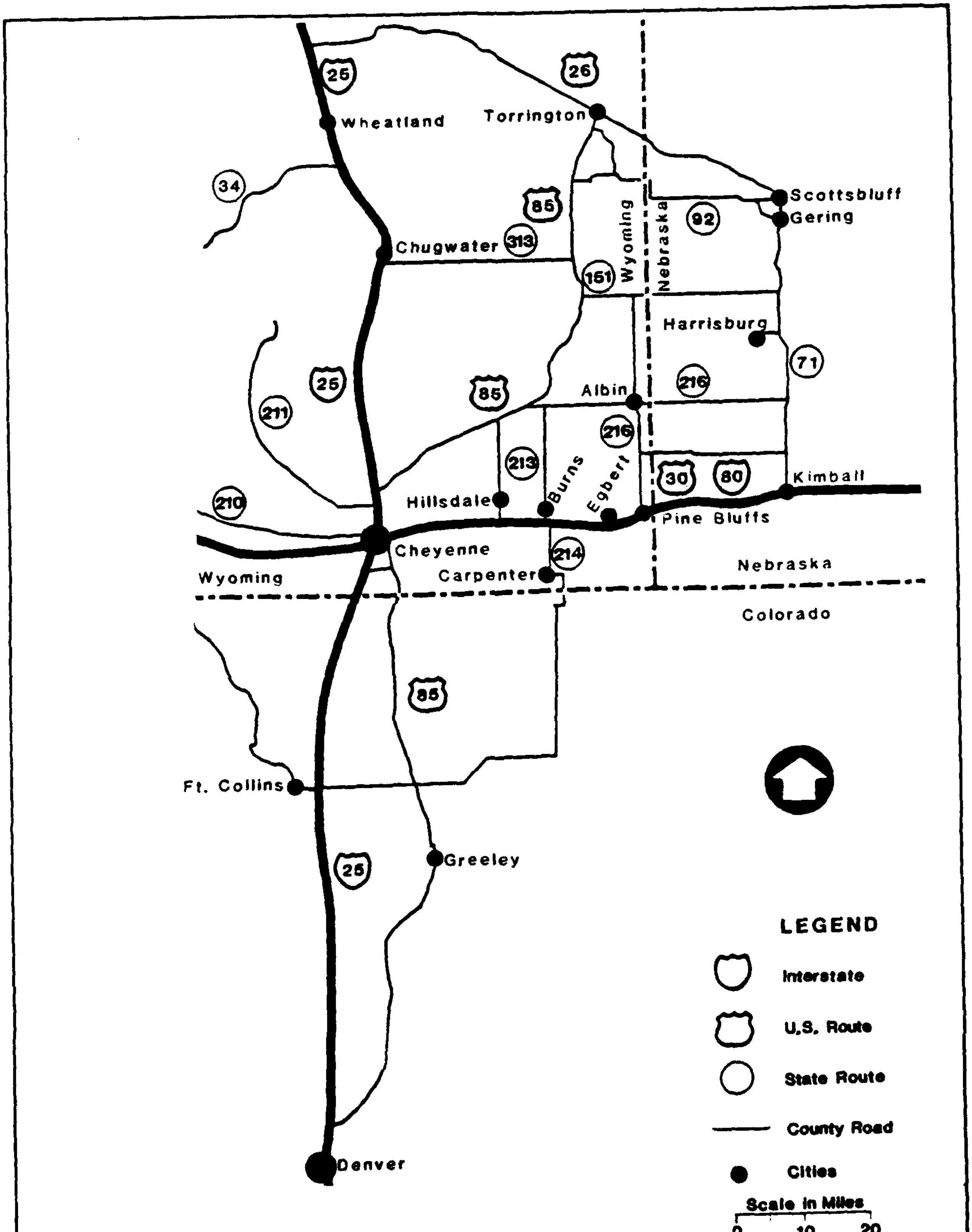


FIGURE 2.6.1-1 REGIONAL HIGHWAYS

Table 2.6.1-1

FUNCTIONAL CLASSIFICATION

Functional System	Character of Service
Arterial	- Highest level of service at the greatest speed for the largest uninterrupted distance.
Collector	- Connectors which provide less highly developed service at lesser speeds for shorter distances by collecting or distributing traffic between local roads and arterials.
Local	- Other roads provide access to abutting areas with little through traffic.

The roadway network of the region has been classified according to the National Highway Functional Classification criteria, as shown in Figure 2.6.1-2. The State of Nebraska is one of several states which also classify their roads according to a different set of classifications and criteria, for purposes unique to a given state.

Another important aspect of the road system is identification of its various segments according to sources and types of funding and jurisdictional responsibilities for construction and maintenance.

The Federal-Aid System, the largest classification of roadway networks, is described in Table 2.6.1-2.

Table 2.6.1-2

THE FEDERAL-AID SYSTEM

Classification	Description
Interstate System	- National System of Interstate and Defense Highways, the routes of highest importance to the nation.
Federal-Aid Primary	- Main arterial roads important to Interstate, system statewide, and regional travel.
Federal-Aid Secondary System	- Rural major collector routes.
Federal-Aid Urban System	- Selected arterials and collectors in urban areas.

The state highway departments and some local agencies maintain an ongoing program of traffic counting at various locations throughout the six counties of the ROI. Traffic count data obtained from the state highway departments and local agencies were analyzed to develop estimates of the 1983 ADT on roads in the ROI. As can be seen in Figure 2.6.1-3, the Interstate and Primary systems carry the highest volumes of traffic.

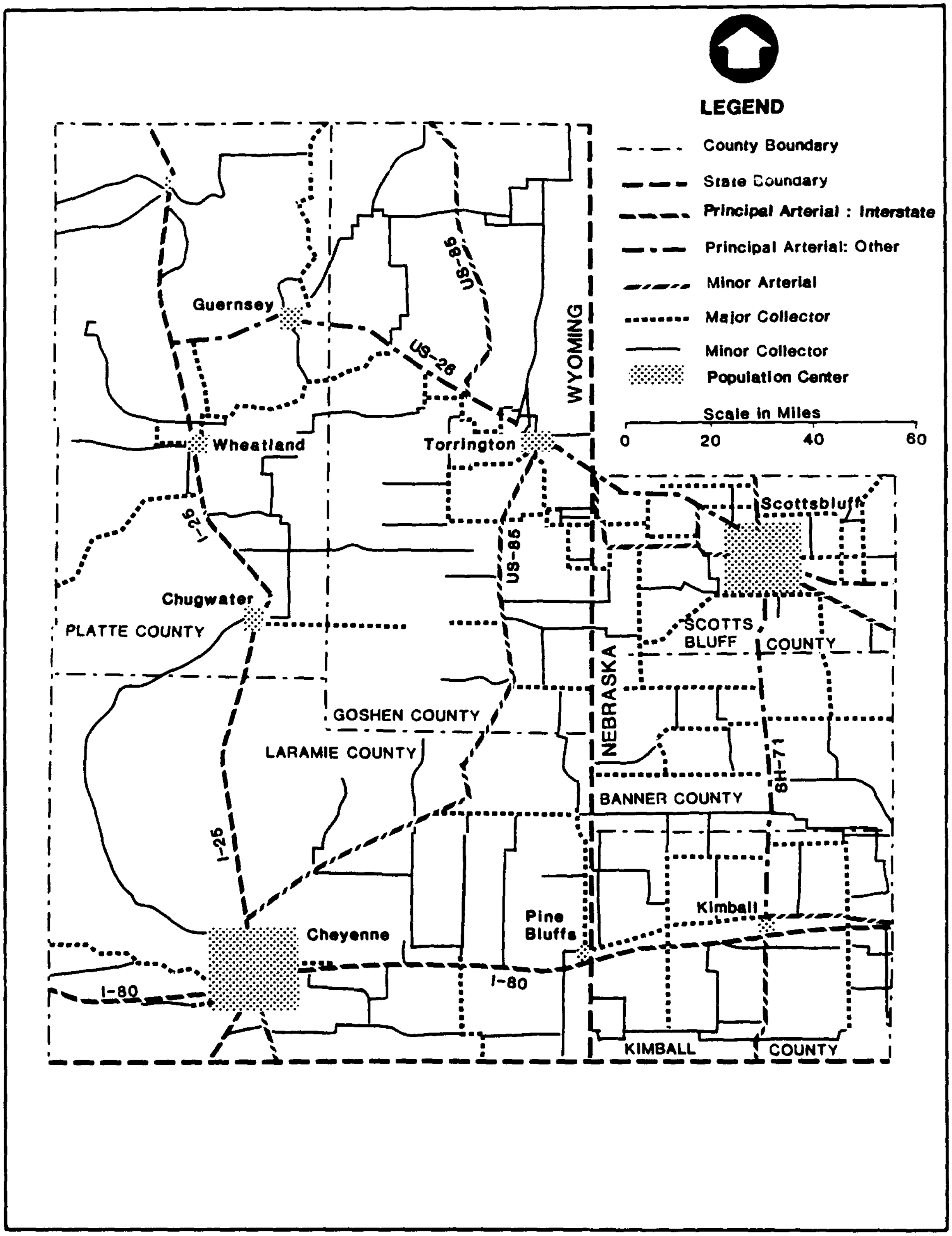


FIGURE 2.6.1-2 NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

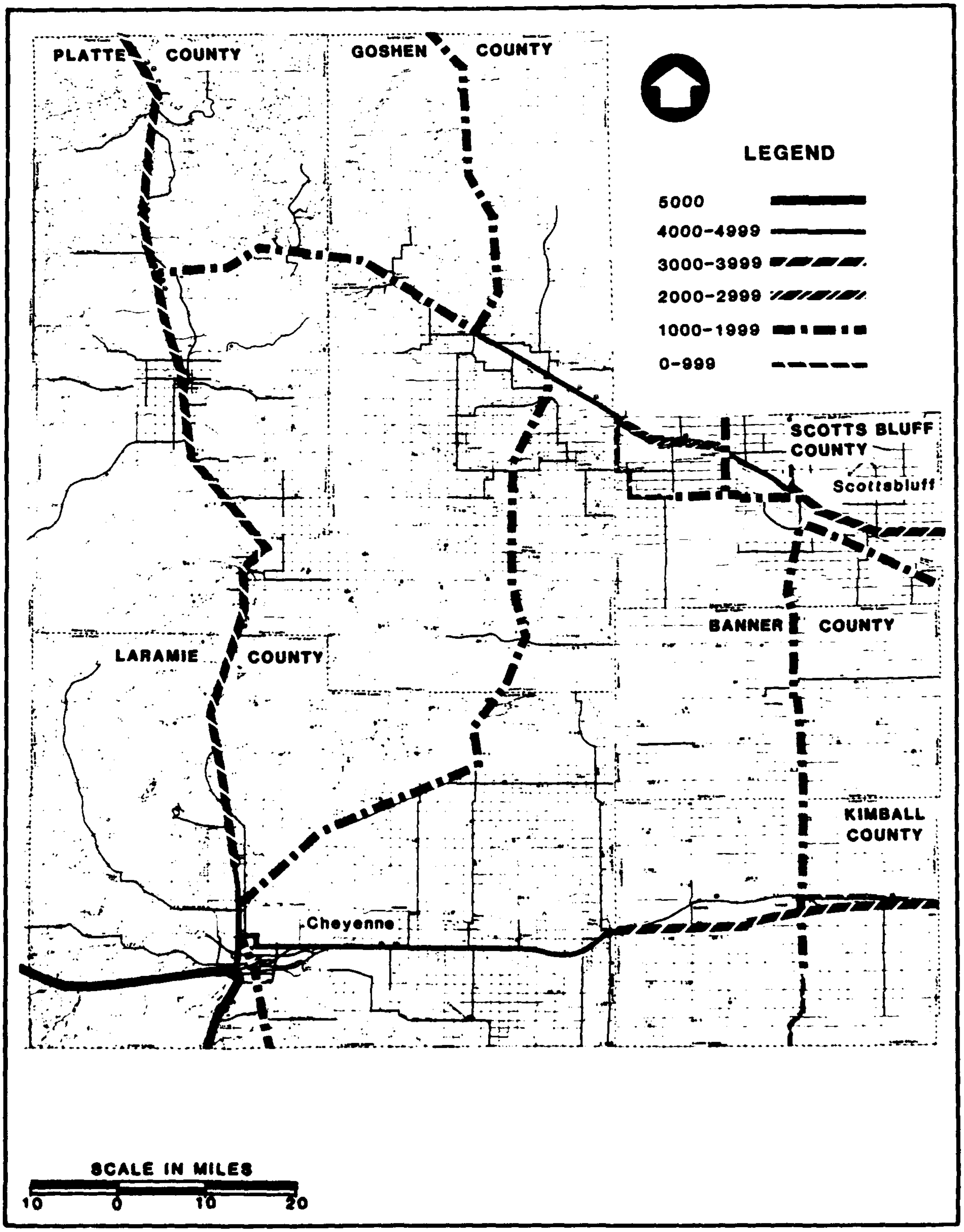


FIGURE 2.6.1-3 1983 CURRENT TRAFFIC VOLUMES ON MAJOR ROADS OF THE REGION

Quantification of these volumes according to the lengths of roadway in each classification produces an estimate of the vehicle miles of travel accommodated by the roadway network. Table 2.6.1-3 shows the amounts of travel on the various highway systems in each county within the ROI.

Minuteman operational activities currently utilize much of the highway roadway network as shown in Figure 2.6.1-4. The amount of travel attributable to direct activity of the missile program is a small portion of the regional totals.

Safety is another aspect related to an evaluation of the adequacy and condition of a transportation system. Both the states of Nebraska and Wyoming maintain and analyze accident records which are related to the roadway network in the counties and urban areas. Tabulations of 1982 accident reports were used to determine the number and pattern of accidents on the road systems.

Current traffic data, classified by vehicle type, were obtained for T/E and other project-related roads as described in Sections 2.5.1.1.4 and 2.5.1.3.

2.6.1.1 Population Centers

2.6.1.1.1 Laramie County, Wyoming

2.6.1.1.1.1 City of Cheyenne

The Cheyenne study area and the major roadways in the area are shown in Figure 2.6.1-5. The study area includes that part of the urban region that may be impacted during project implementation. Both the study area and the major roadways were developed through consultation with representatives of the WHD, the City of Cheyenne, and Laramie County. More intensive current development in Cheyenne is south of Four Mile Road and east of Interstate 25. The area west of Interstate 25 and north of Four Mile Road is included due to its proximity to F.E. Warren AFB.

Major roadways include roadways "functionally classified" as principal arterials, minor arterials, and selected collectors. As the term implies, "functional classification" is a system that classifies roadways according to the function they perform. The basic criteria in the classification system concerns the function of the road as providing movement or access. For example, a principal arterial freeway serves movement, whereas a local city street serves access.

Roadways that primarily serve movement rather than access are the main focus for urban areas. Accordingly, all principal arterials and minor arterials are included. Collectors are also included if they have a significant traffic movement function. The resulting system of roadways forms the desired transportation network for study purposes.

Figure 2.6.1-6 shows the administrative jurisdiction of the major roads in the Cheyenne area. This includes roads under state, city, and county jurisdiction. State roads typically include several Federal-Aid systems including the Federal-Aid Interstate, primary, secondary, and urban systems. These systems are eligible for federal funding under the subject categories. The state system also includes roads which are not on Federal-Aid systems.

Table 2.6.1-3

1983 DAILY VEHICLE MILES OF TRAVEL
(Thousands)

	Interstate	Federal Aid Primary	Federal Aid Secondary	County Roads	Totals
Nebraska					
Banner					
Urban	-	-	-	-	-
Rural	-	34	17	8	59
Total	-	34	17	8	59
Kimball					
Urban	-	-	-	-	-
Rural	136	62	28	33	259
Total	136	62	28	33	259
Scotts Bluff					
Urban	-	53	166	42	261
Rural	-	250	84	72	406
Total	-	303	250	4	667
NEBRASKA TOTAL:	136	399	295	155	985
Wyoming					
Laramie					
Urban	103	172	374	324	973
Rural	504	68	44	86	702
Total	607	240	418	410	1,675
Platte					
Urban	-	-	-	-	-
Rural	276	45	51	82	454
Total	276	45	51	82	454
Goshen					
Urban	-	-	-	-	-
Rural	-	190	43	90	323
Total	-	190	43	90	323
WYOMING TOTAL:	883	475	512	582	2,452
REGION OF INFLUENCE TOTAL:					3,437

Source: Wyoming Highway Department and Nebraska Department of Roads.

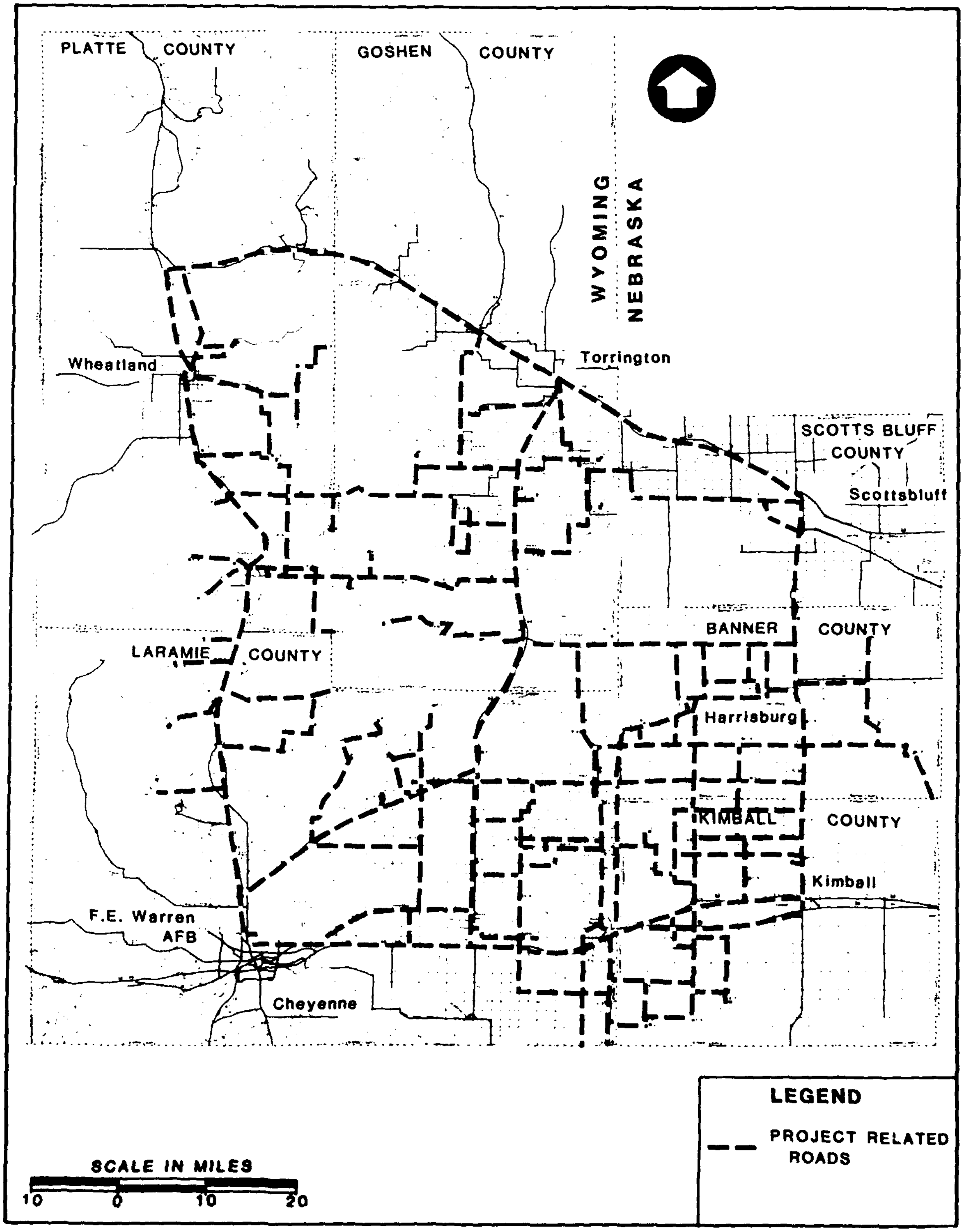


FIGURE 2.6.1-4 PROJECT RELATED ROADS

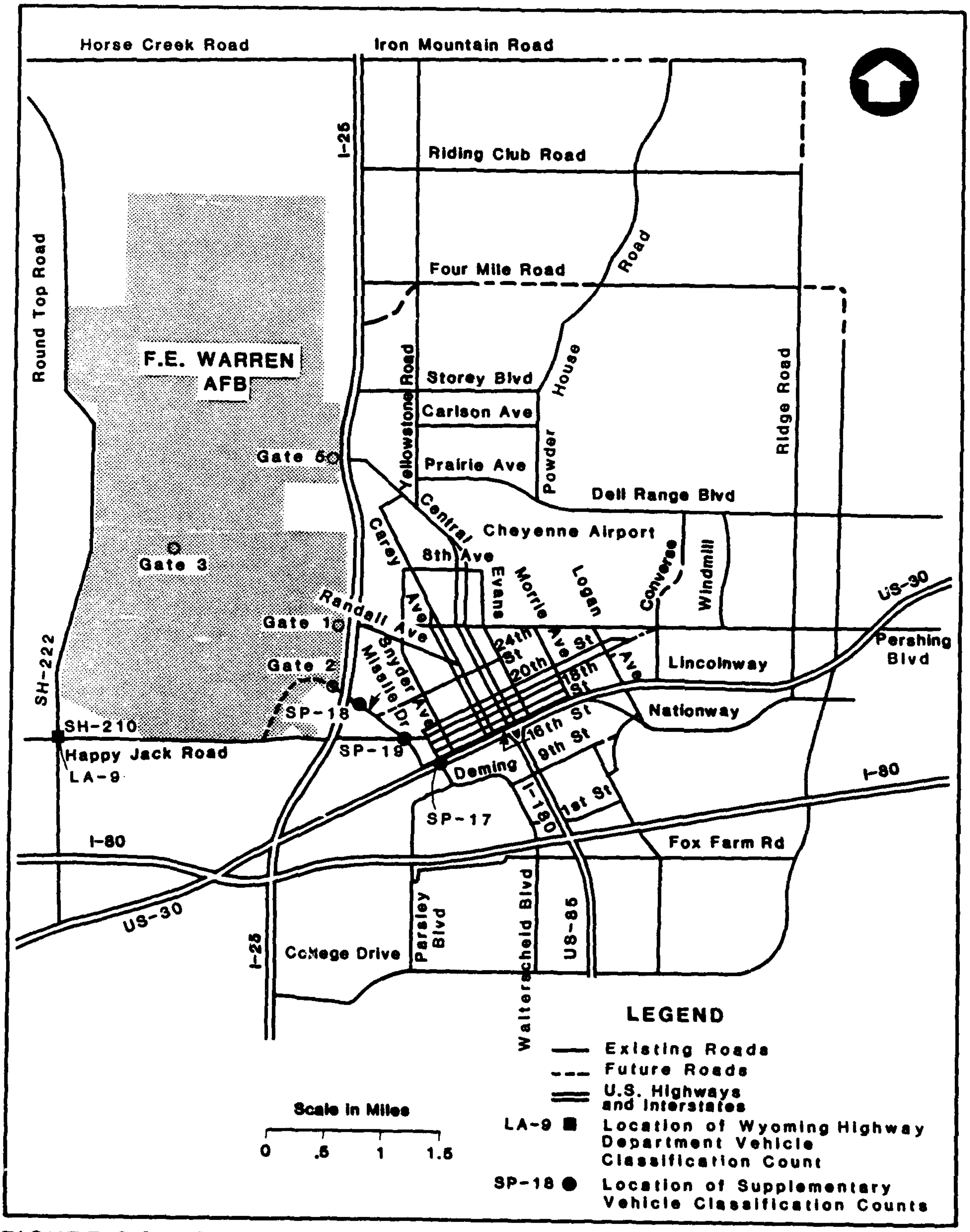


FIGURE 2.6.1-5 CHEYENNE, WYOMING, ROADWAY NETWORK

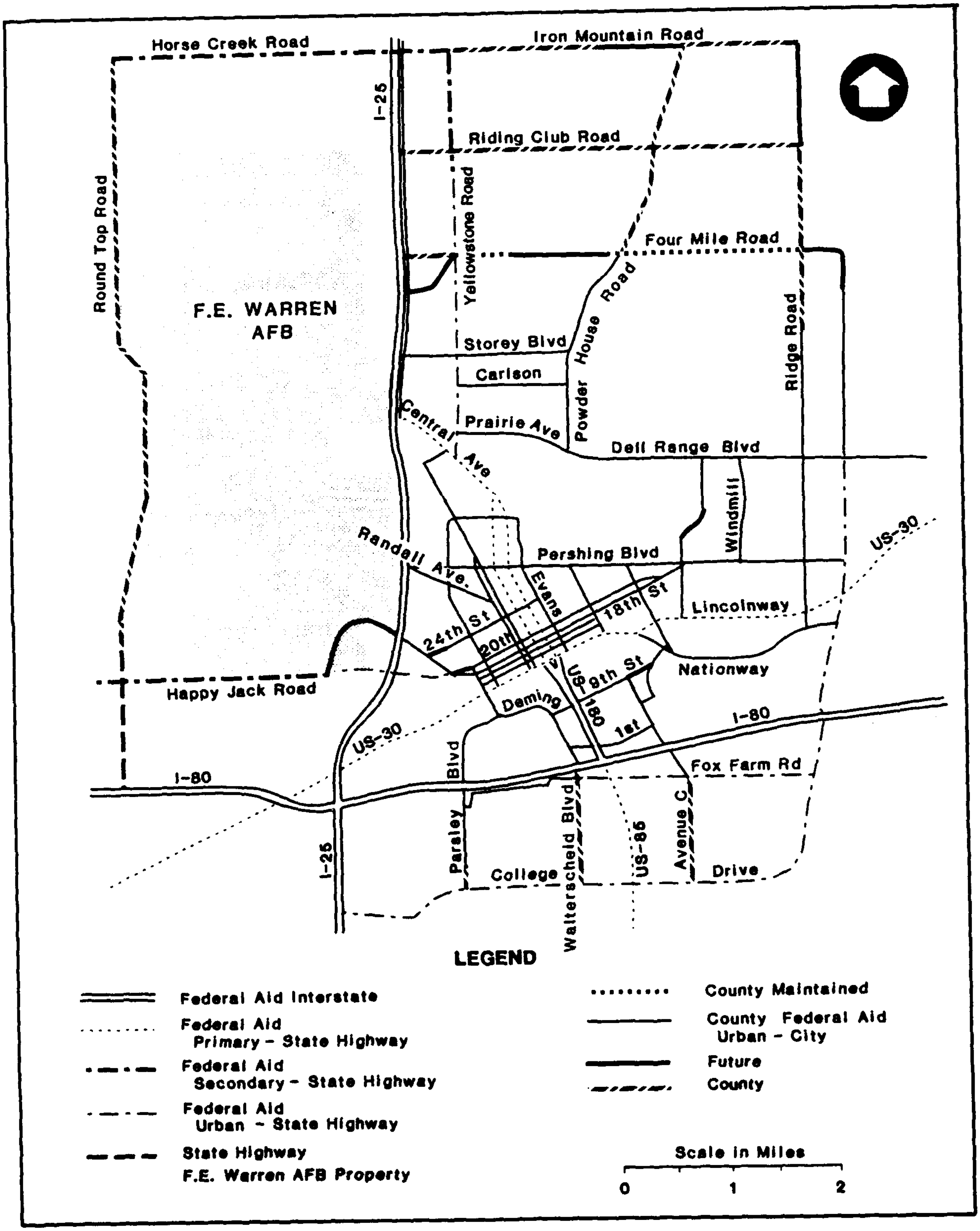


FIGURE 2.6.1-6 ADMINISTRATIVE JURISDICTION OF MAJOR ROADWAYS IN THE CHEYENNE AREA

County roads are located on the urban fringe of the area and include roads in two categories: those roads only maintained by the county and roads under the full jurisdiction of the county. The City of Cheyenne is responsible for local streets, including a few roads on the Federal-Aid Urban System.

Road jurisdiction may be subject to change during the course of the study period. For example, if Four Mile Road or the Iron Mountain - Ridge Road loop assume a more important role, they will probably be absorbed by the state and possibly be placed on a Federal-Aid System.

Figure 2.6.1-7 shows the functional classification of major roadways in the area. This is the official designation approved by the city, county, WHD, and Federal Highway Administration. Functional classification serves an important administrative purpose, as it assists in the selection of roadways for federal and state system designation and project funding.

Figure 2.6.1-8 shows the areas of the community considered to have growth potential. These areas are within the sewer and water service area and were identified by the Cheyenne-Laramie County Regional Planning Office as areas where future housing development could be expected.

Figure 2.6.1-9 shows the roadway characteristics including the number of through lanes, locations of continuous turn lanes, and one-way directional movements. Planned roadway improvements that will increase capacity are also illustrated in this figure.

Figures 2.6.1-10 through 2.6.1-13 present information relative to roadway conditions, traffic signal systems, and high accident locations in the Cheyenne area.

There are 92 existing signalized intersections within the Cheyenne area, of which 77 are located within the study network. Traffic signals are proposed to be installed by the City of Cheyenne at three other intersections within the study network. The 77 existing signalized intersections and the 3 proposed signalized intersections are considered to represent the controlling element for the network analysis.

There are two interconnected and synchronized traffic signal systems in Cheyenne. One is a hardwired demand-responsive interconnect system along Pershing Boulevard installed as a traffic demonstration project in 1979. The other consists of a pre-timed synchronized system operating on one dial for the Central Business District area. This system consists of both hardwire and telephone system decoders, portions of which are up to 20-years old.

There were 33 intersections, identified in Table 2.6.1-4 which averaged 5 or more accidents per year from 1979 to 1981. Of these, only one, located at 19th and Snyder, was not signalized. The 1980 collision diagram for 19th and Snyder indicates seven right angle accidents, the type often correctible by traffic signals. The City of Cheyenne has proposed a traffic signal at this intersection. The accidents at the other 32 signalized intersections comprised mainly rear-end and angle-type accidents.

There were also nine intersections which were not included in the study network, but which experienced seven or more accidents per year. These

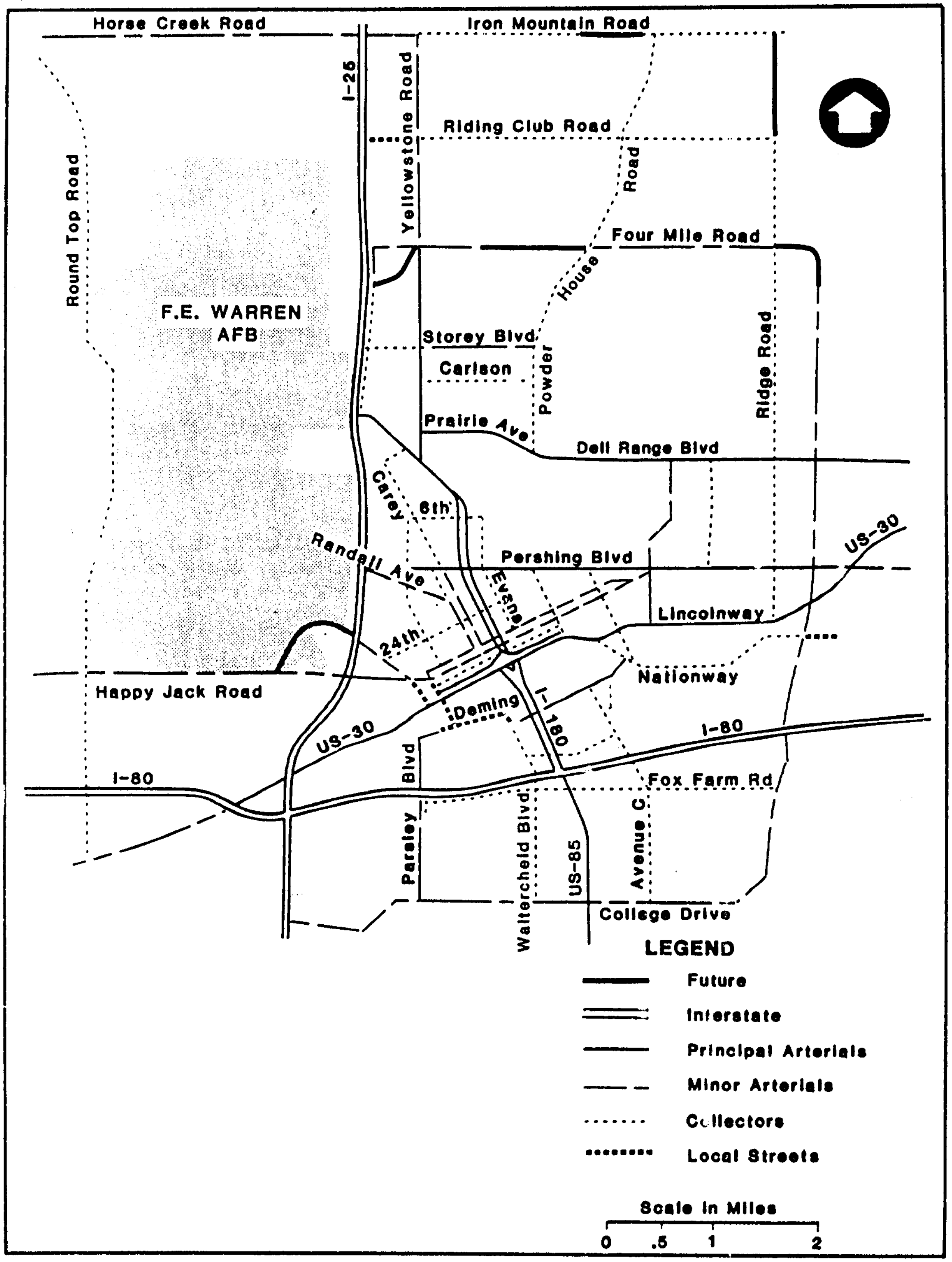


FIGURE 2.6.1-7 FUNCTIONAL CLASSIFICATIONS OF MAJOR ROADWAYS IN THE CHEYENNE AREA

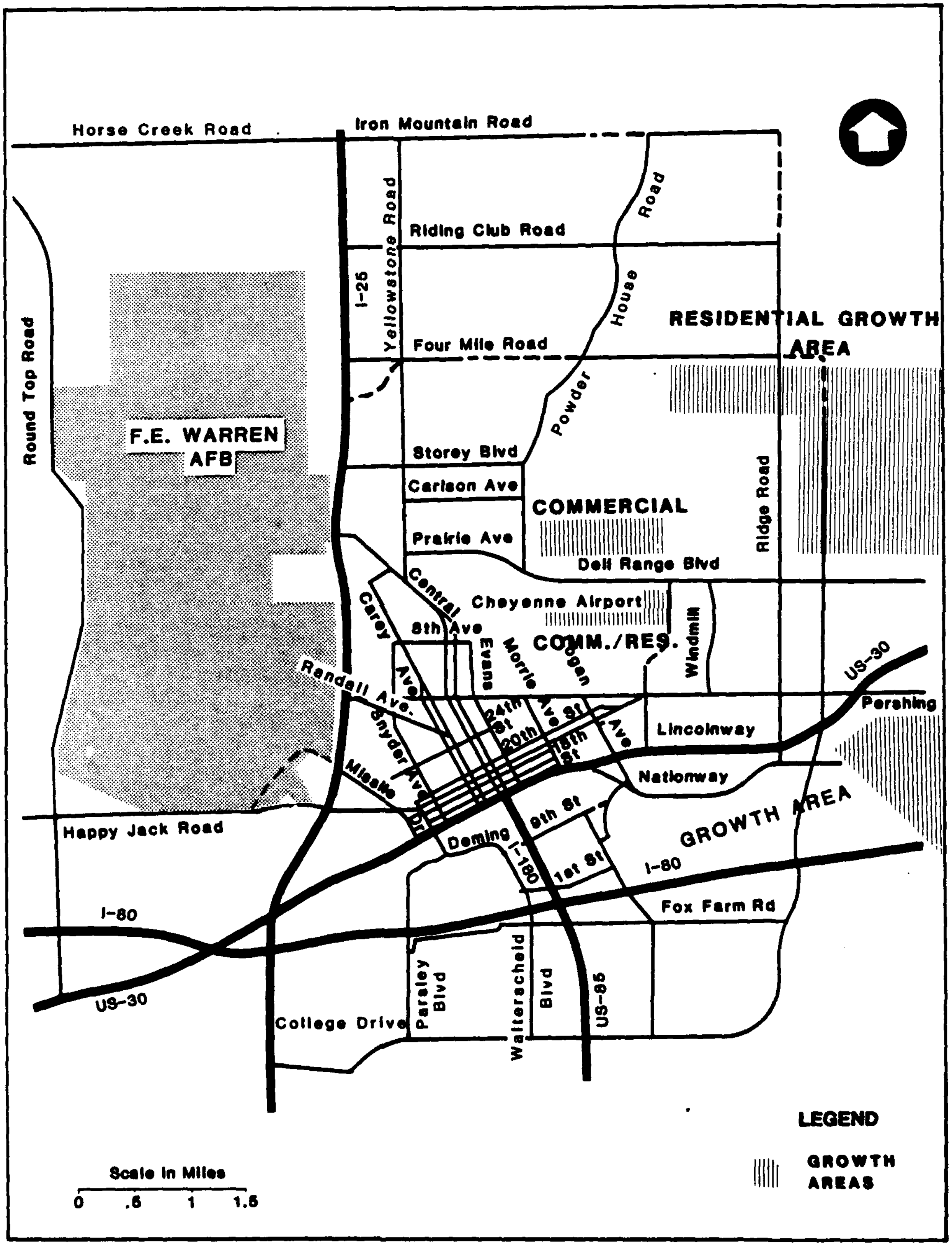


FIGURE 2.6.1-8 POTENTIAL GROWTH AREAS IN CHEYENNE

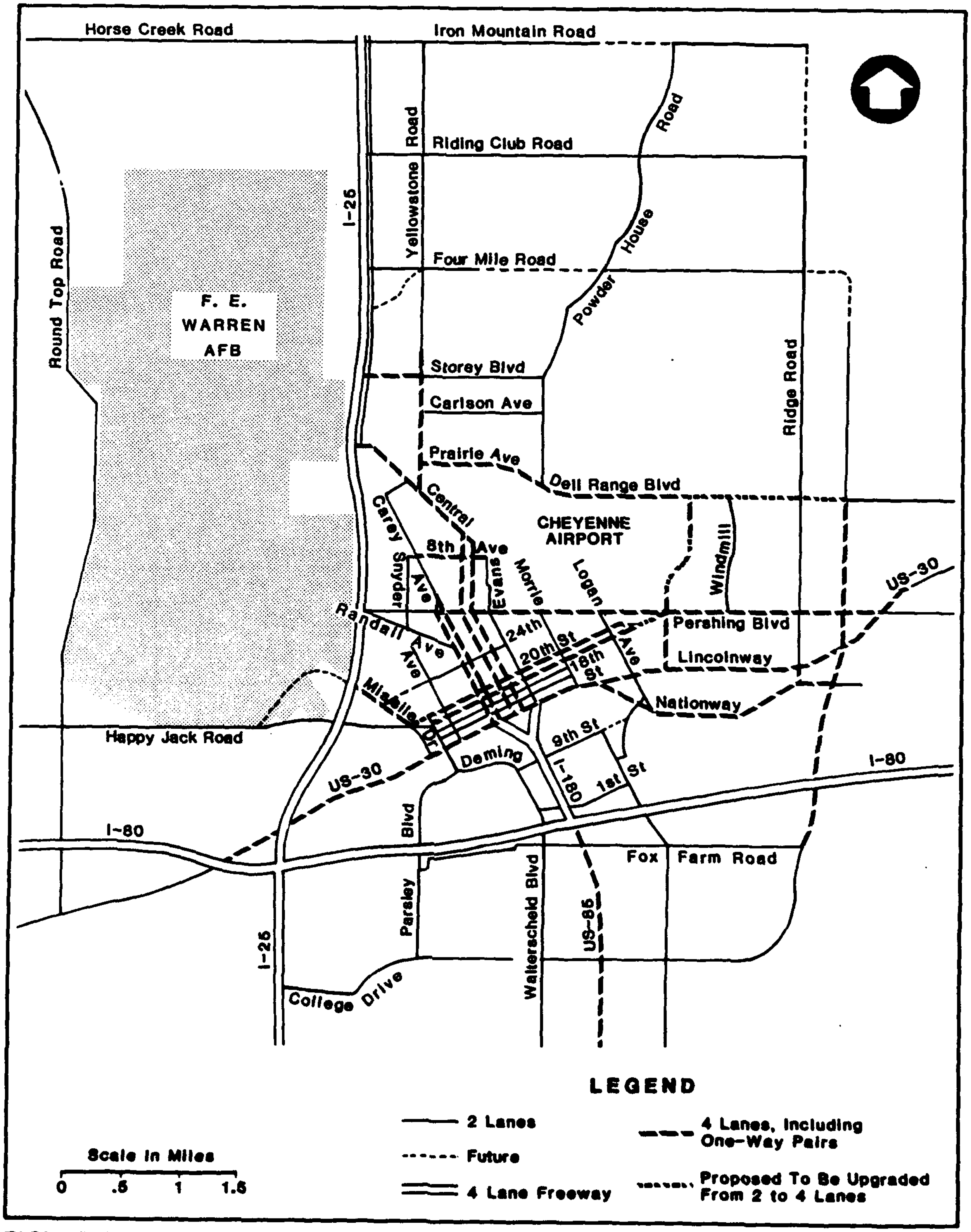


FIGURE 2.6.1-9 ROADWAY CHARACTERISTICS AND PLANNED IMPROVEMENTS IN THE CHEYENNE AREA

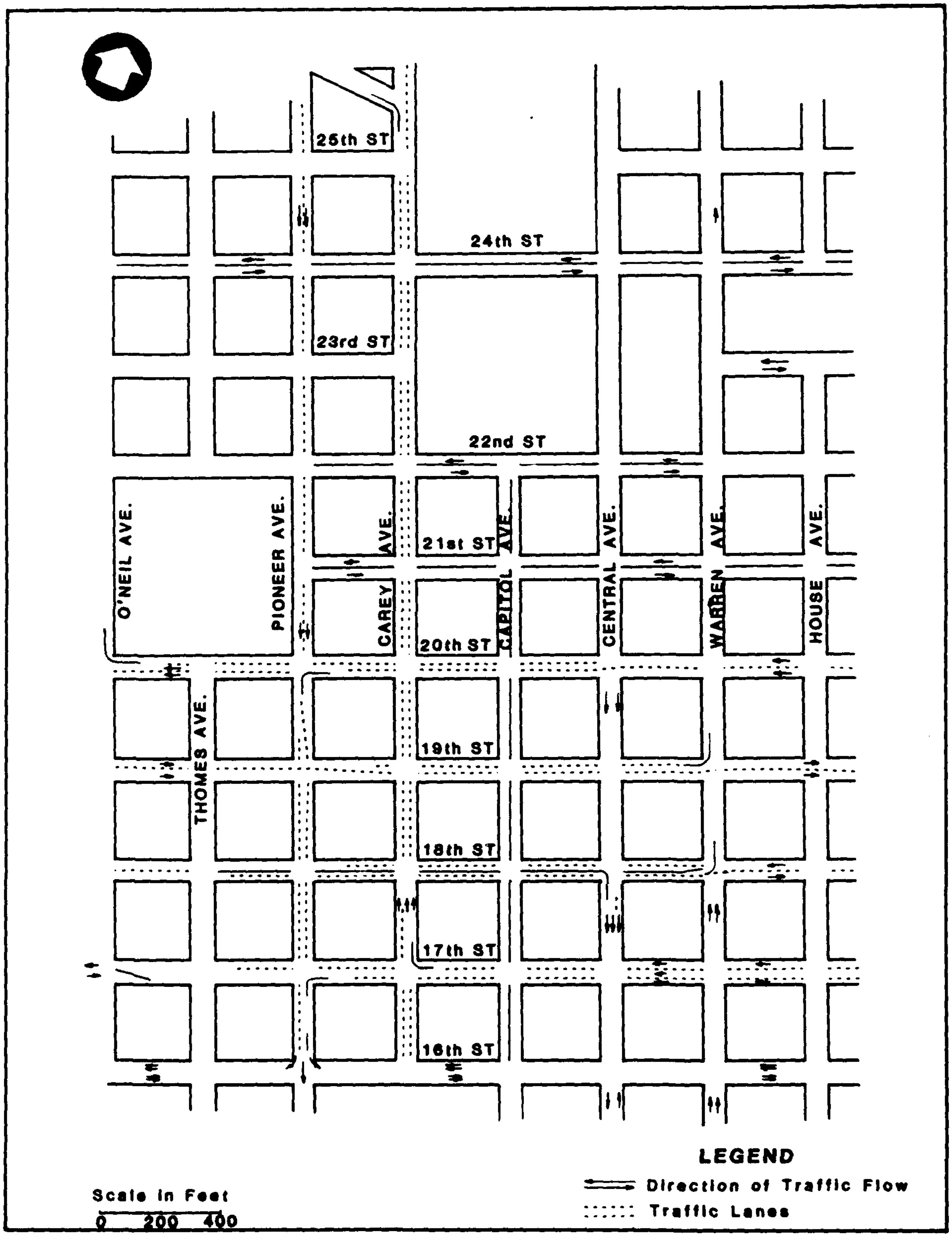


FIGURE 2.6.1-10 ROADWAY CHARACTERISTICS IN DOWNTOWN CHEYENNE

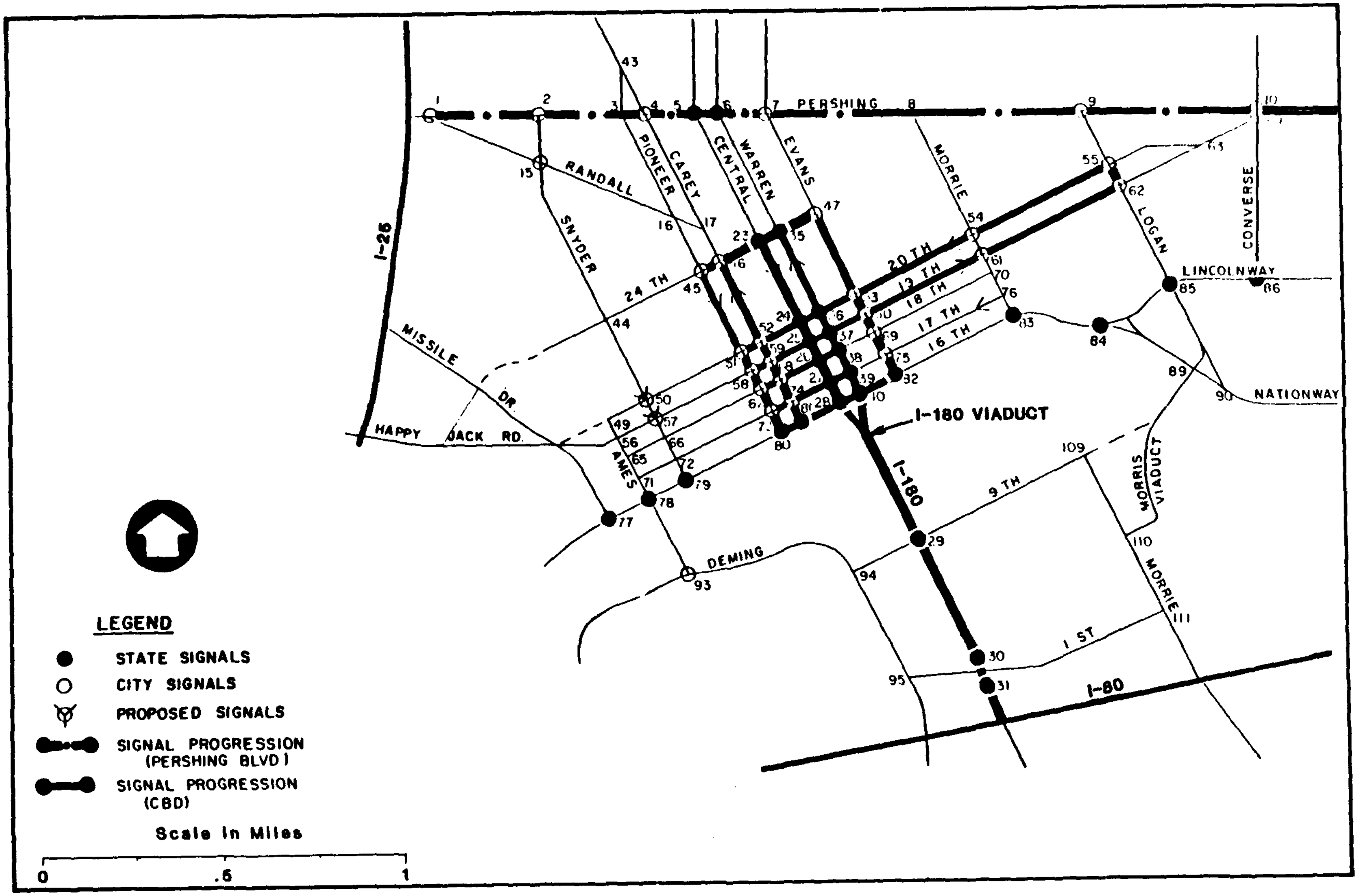


FIGURE 2.6.1-11 DOWNTOWN CHEYENNE TRAFFIC SIGNAL SYSTEM

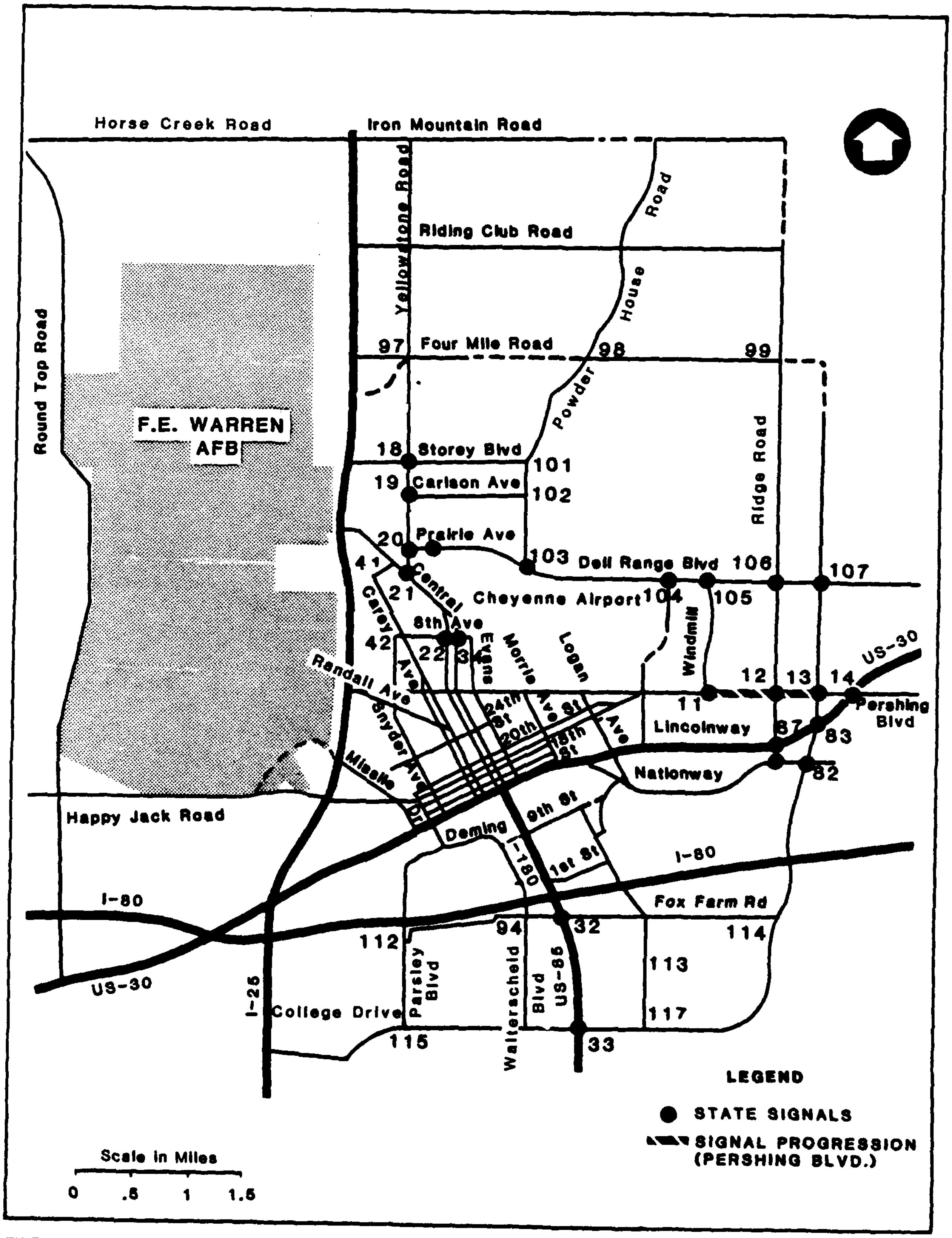


FIGURE 2.6.1-12 CHEYENNE AREA TRAFFIC SIGNAL SYSTEM

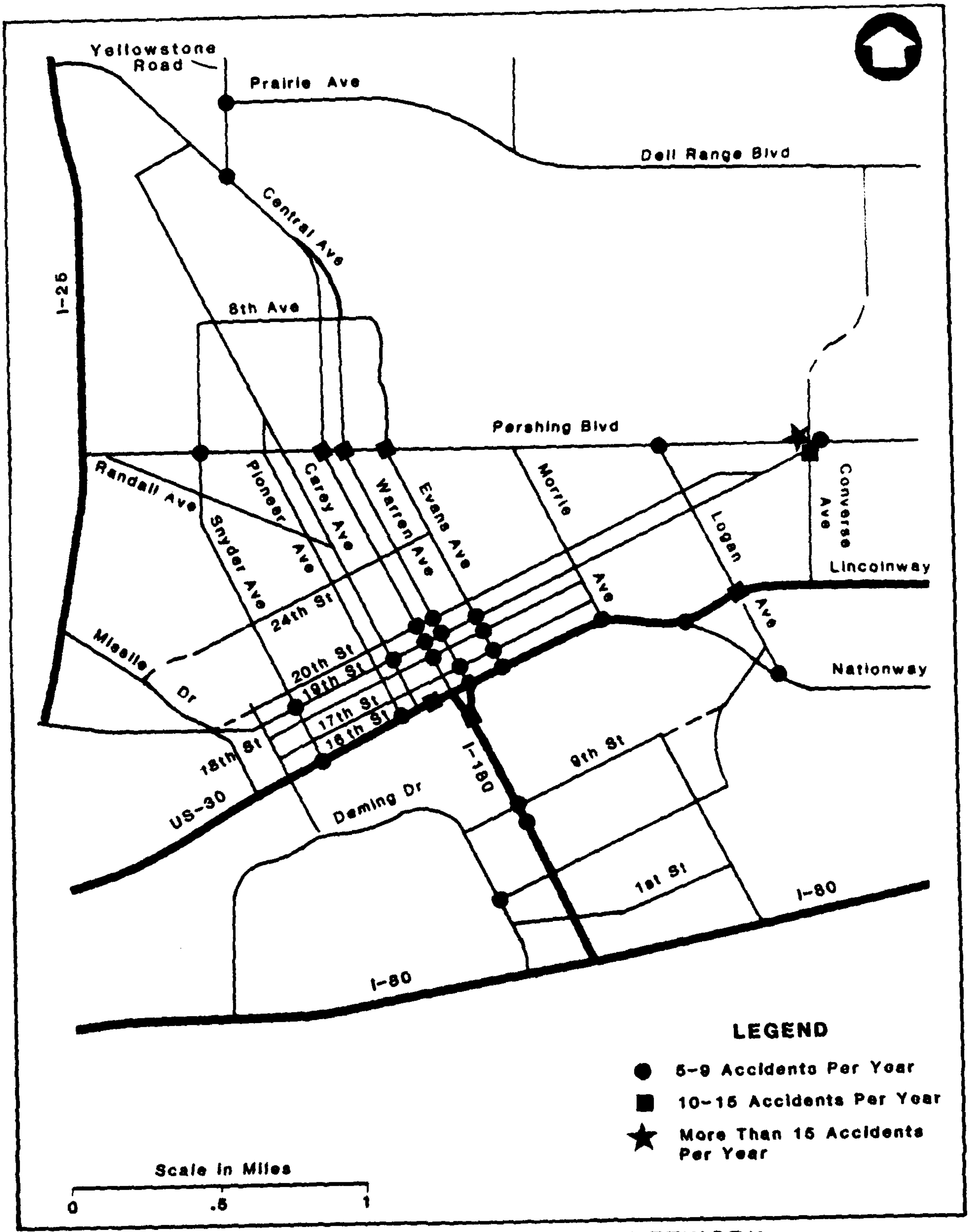


FIGURE 2.6.1-13 CHEYENNE AREA STUDY NETWORK HIGH ACCIDENT LOCATIONS

Table 2.6.1-4

STUDY NETWORK HIGH ACCIDENT LOCATIONS
(AVERAGE 1979, 1980, 1981)

Ranking	LOC No.	Intersections[1]	Average Annual Accidents
1	10	Pershing Blvd. at Converse	20
2	28	Central at 16th (Lincolnway)	16
3	5	Pershing Blvd. at Central	15
4	85	Lincolnway at Logan	15
5	6	Pershing Blvd. at Warren	13
6	78	Lincolnway at Ames	12
7	7	Pershing Blvd. at Evans	11
8	64	19th at Converse	13
9	86	Lincolnway at Converse	10
10	40	Lincolnway (16th) at Warren	9
11	21	Yellowstone at Central	8
12	24	Central at 20th	8
13	89	Nationway at Logan	8
14	83	Lincolnway (16th) at Morrie	7
15	75	17th at Evans	7
16	25	Central at 19th	7
17	69	18th at Evans	7
18	36	Warren at 20th	6
19	55	20th at Logan	6
20	2	Pershing Blvd. at Snyder	6
21	9	Pershing Blvd. at Logan	6
22	20	Yellowstone at Prairie Ave.	6
23	23	Central at 24th	6
24	26	Central at 18th	6
25	79	Lincolnway (16th) at Snyder	6
26	82	Lincolnway (16th) at Evans	6
27	29	Rt. I-180 (Central) at 9th	7
28	37	Warren at 19th	5
29	39	Warren at 17th	5
30	57	19th at Snyder	5
31	60	19th at Evans	5
32	74	17th at Carey	5
33	80	16th at Pioneer	5

Notes: 1 See Figure 2.6.1-13.

Source: Annual Accident Data Report, City of Cheyenne, 1979, 1980, 1981.

locations are listed in Table 2.6.1-5 and exhibit accident patterns similar to the high accident network study locations.

Table 2.6.1-5

HIGH ACCIDENT LOCATIONS - NOT INCLUDED IN STUDY NETWORK PLAN (AVERAGE 1979, 1980, 1981)

Ranking	Intersections	Average Annual Accidents
1	Riner Viaduct (N. End)	12
2	I-180 at Fifth 10	
3	Lincolnway at Capital	10
4	Lincolnway at Dunn	9
5	Central at Eighth	9
6	Central at Fifth	7
7	Deming at Fifth 7	
8	Central at Walker (South of Cheyenne)	7
9	Pershing at 19th	7

Source: Annual Accident Data Reports; City of Cheyenne, 1979, 1980, 1981.

Figures 2.6.1-14 and 2.6.1-15 show the estimated current 1983 ADT volumes and design hour volumes (DHV) on the major roadways. These counts are based on data from ATRs operated by the State, and from short-term counts made by both the State and the City. The ATRs are permanent recording stations, operating continually. They provide an accurate measure of ADT and assist in evaluating traffic, growth trends, peak-hour factors, and vehicle classification. Table 2.6.1-6 presents an analysis of design hour traffic volumes; Table 2.6.1-7 shows traffic trends at ATRs in Cheyenne. In addition to traffic data from the ATRs, both the City and State conduct traffic counts for limited periods of time. These counts are typically made for a few days and may or may not accurately depict ADT values. ADT is a specific number that represents the yearly traffic divided by 365. At best, the short-term counts provide only estimates of ADT with an error of plus or minus 10 to 15 percent. Data obtained from the City and State were plotted on a map and evaluated for inconsistencies. Data were then rounded to avoid a false impression of accuracy that might be implied from more precise reporting. DHVs were estimated by using a "design hour" factor of 11 percent. This value was based on a review of ATR data in Table 2.6.1-6.

Figures 2.6.1-16 and 2.6.1-17 present the 1983 traffic LOS in Cheyenne and identify those intersections that currently experience congestion.

Vehicle classification counts were made at three locations within Cheyenne, at points where it was anticipated that project-related truck traffic would occur. Truck traffic was classified according to the Wyoming Highway Department methods. The locations of these counting stations are shown in Figure 2.6.1-15 and classification data is given in Table 2.6.1-8. Vehicle classification data were also obtained from the Wyoming Highway Department and is included in Table 2.6.1-8.

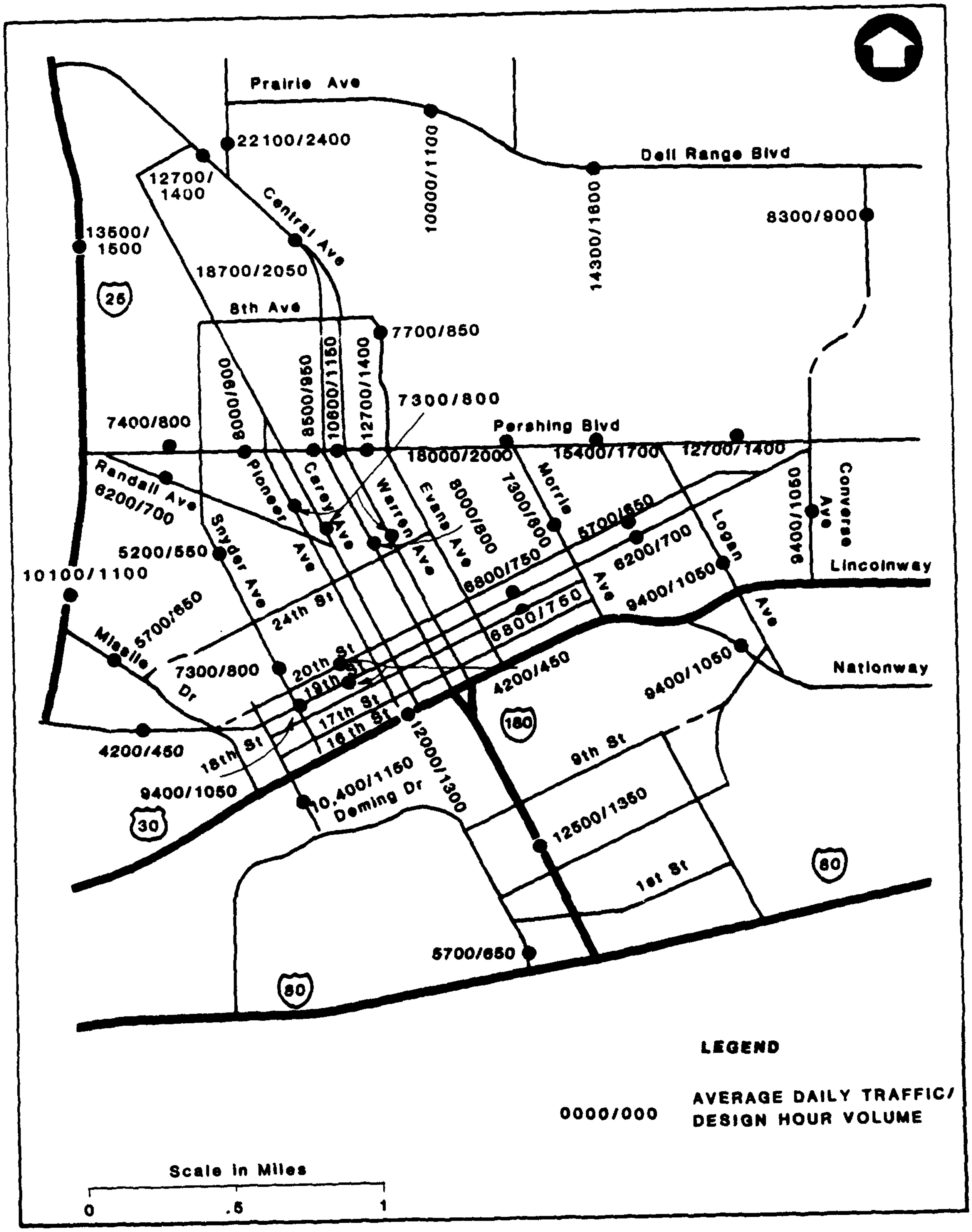


FIGURE 2.6.1-14 1983 ESTIMATED TRAFFIC VOLUMES IN DOWNTOWN CHEYENNE

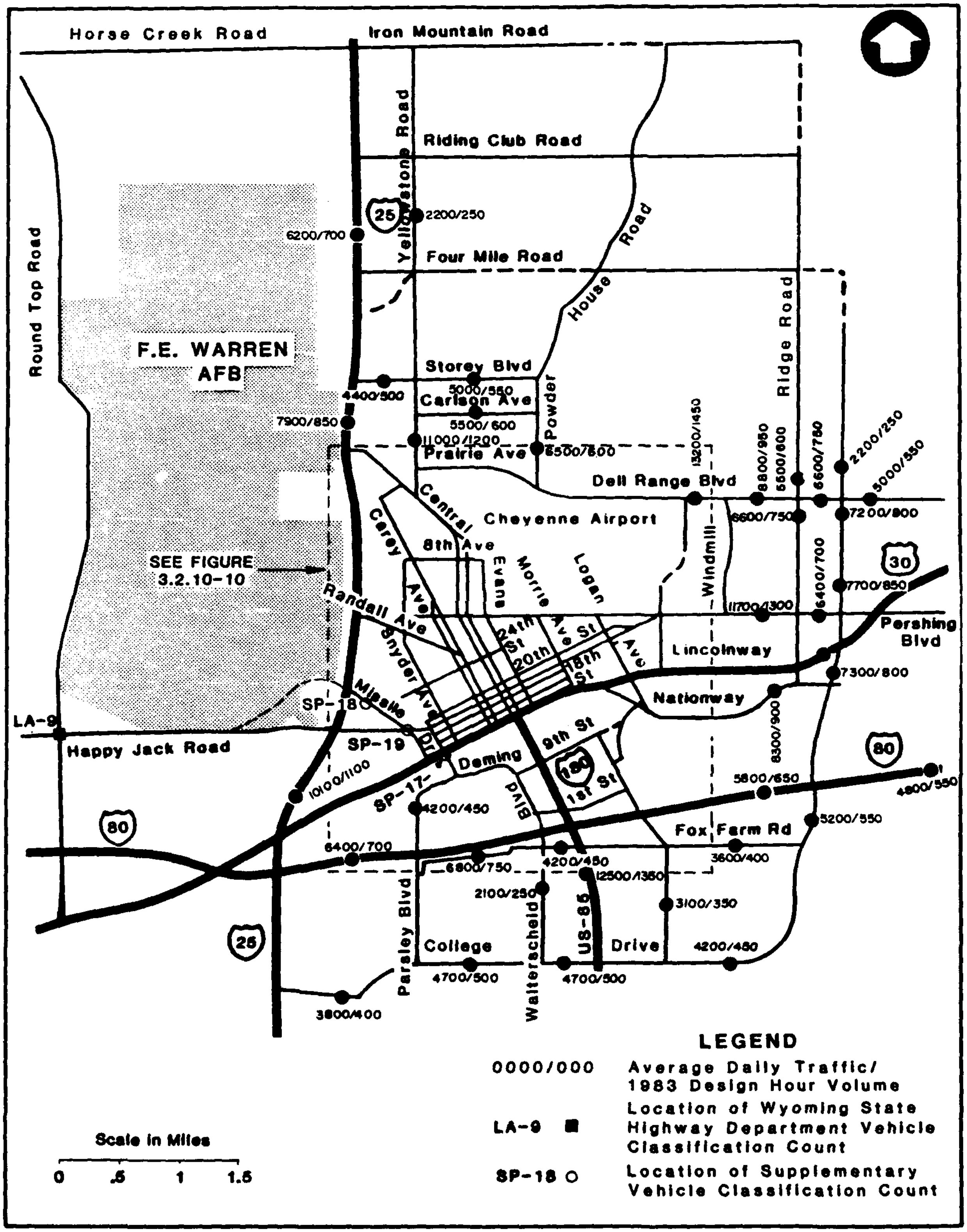


FIGURE 2.6.1-15 1983 ESTIMATED TRAFFIC VOLUMES IN THE CHEYENNE AREA

Table 2.6.1-6

DESIGN-HOUR TRAFFIC VOLUMES AT AUTOMATIC TRAFFIC RECORDERS IN THE CHEYENNE AREA

ATR Counter	Route	1981 ADT	30th Highest Hour[1]		50th Highest Hour[1]	
			Volume	% of ADT	Volume	% of ADT
10	I-80	5,777	692	12.0	676	11.7
80	I-180	12,350	1,179	9.5	1,155	9.4
70	Wy. 219	2,171	266	12.3	256	11.8
120	Norris Viaduct	9,803	976	10.0	954	9.7
150	Deming Underpass	9,997	1,148	11.5	1,122	11.2
330	22nd Street	1,582	211	13.3	203	12.8
341	Central	8,394	927	11.0	900	10.7
343	Warren	7,275	812	11.2	795	10.9
520	I-25	5,058	575	11.4	548	10.8

Notes: 1 Highways are typically designed for an hourly volume. Based on extensive investigations (Highway Capacity Manual, Highway Research Board Special Report No. 87, 1965), the 30th highest annual hourly volume is generally used for design purposes. For example, a year has 8,760 hours. The high one-hour volume is not recommended for design purposes due to economic reasons, while consideration is given to the 10th through the 50th highest hours. The 30th highest hour is typically used, and is frequently expressed as a percentage of the average daily traffic (ADT).

Source: Wyoming Highway Department, 1981.

Table 2.6.1-7

TRAFFIC TRENDS AT AUTOMATIC TRAFFIC RECORDERS
IN THE CHEYENNE AREA

ATR Counter	Route	ADT 1973	ADT 1977	ADT 1981	Percent Traffic Growth Rate 1973-77	Percent Traffic Growth Rate 1977-81	Percent Traffic Growth Rate 1973-81
10	I-80	5,234	5,707	5,777	+2.19	+0.31	+1.24
80	I-180	11,999	11,451	12,350	-1.16	+1.91	+0.36
70	Wy. 219	1,362	1,821	2,171	+7.53	+4.49	+6.00
120	Norris Viaduct	11,869	10,314	9,803	-3.45	-1.26	-2.36
150	Deming Underpass	8,958	9,505	9,997	+1.49	+1.27	+1.38
330	22nd Street	1,393	1,397	1,582	+0.07	+3.16	+1.60
341	Central	7,435	8,131	8,394	+2.26	+0.80	+1.53
343	Warren	6,380	7,487	7,275	+4.08	-0.72	+1.65
520	I-25	3,183	4,363	5,058	+8.20	+3.76	+5.96

Source: Wyoming Highway Department, 1973, 1977, 1981.

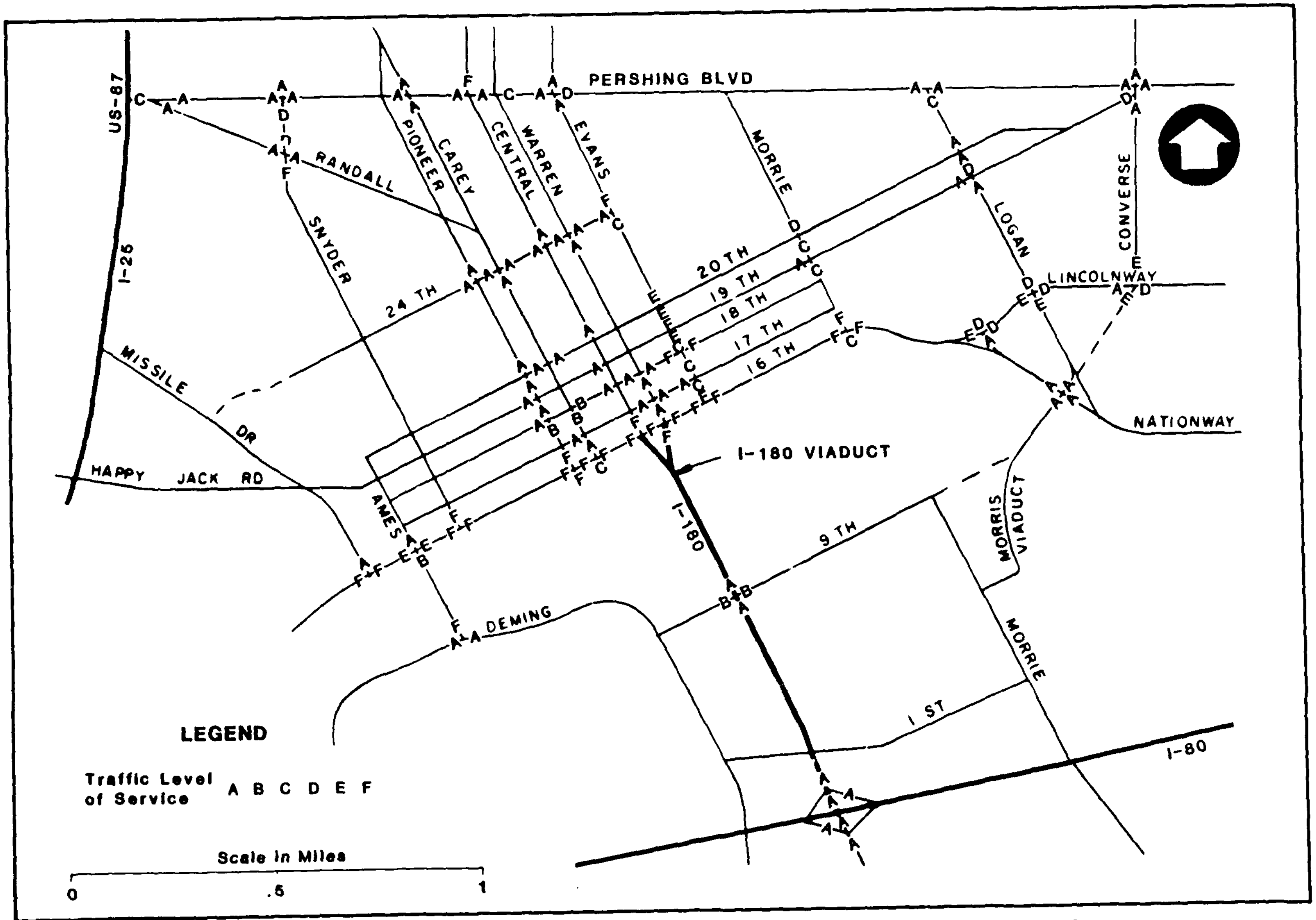


FIGURE 2.6.1-16 1983 TRAFFIC LEVEL OF SERVICE IN DOWNTOWN CHEYENNE

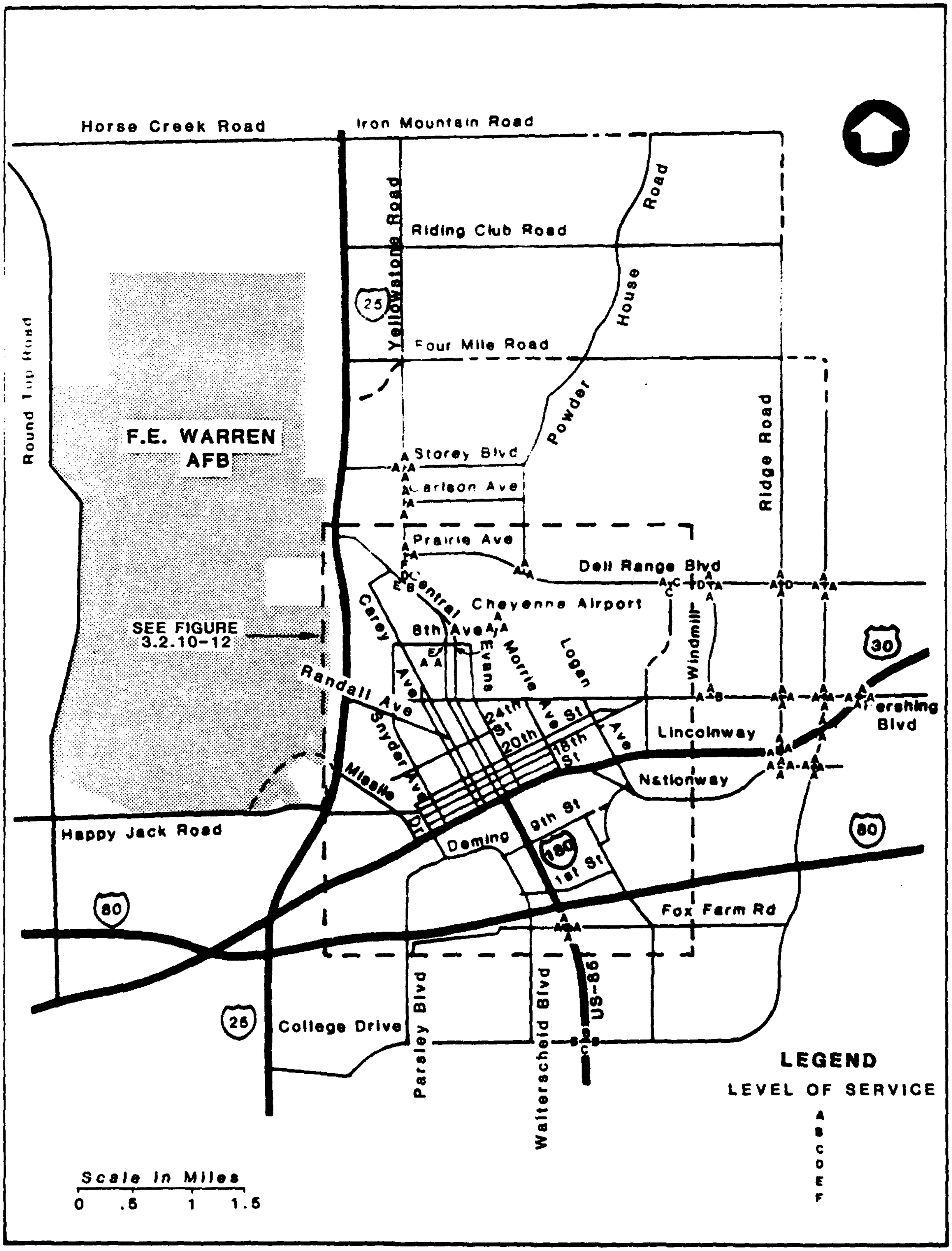


FIGURE 2.6.1-17 1983 TRAFFIC LEVEL OF SERVICE IN THE CHEYENNE AREA

Table 2.6.1-8

1983 VEHICLE CLASSIFICATION DATA - CHEYENNE

Station	Location	No. of Trucks and Buses: Peak Hrs.	No. of Trucks and Buses: Daily Traffic	No. of Trucks and Buses: Percentage of Total Vehicles	ADT Total Vehicles
LA 9	WY 222 North	N/A	63	13.5%	466
LA 9	WY 222 South	N/A	63	30.4%	207
LA 9	WY 210 East	N/A	174	12.8%	1361
LA 9	WY 210 West	N/A	182	17.5%	1042
SP-17	W. Lincolnway (West)	34	317	4.5%	7037
SP-17	W. Lincolnway (East)	33	262	4.4%	5987
SP-17	Deming Drive	38	320	4.4%	7354
SP-17	Dey Road	11	81	5.8%	1405
SP-18	Missile Drive	23	232	6.2%	3742
SP-19	Missile Dr. (North)	35	237	6.3%	3739
SP-19	Missile Dr. (South)	21	175	6.6%	2671
SP-19	Happy Jack Road	27	240	7.6%	3153
SP-19	19th Street	18	134	4.6%	2882

N/A - Not Available

Due to the nature of the project, specific attention was given to traffic operation at F.E. Warren AFB. Vehicular access to F.E. Warren AFB is controlled by manned and unmanned gates. The main entrance to the base is Gate No. 1 at Randall Avenue. This is a 24-hour manned gate. All visitors must enter the base through this gate after securing a visitor's pass. The gate facility is four lanes wide with a center gatehouse building and canopy covering the two interior lanes.

The second manned gate, gate Number 2, is located in the south base area on Missile Drive at the intersection of Interstate 25. This gate has four lanes with a central gatehouse and is operational during the hours of 6:30 AM to 5:30 PM.

Gate No. 3 is located west of Bannock Road and serves Round Top Road. This gate is electronically controlled and activated by coded plastic cards. The gate provides access to areas outside the base on the western perimeter (Round Top Road) and to activities within the base along the western perimeter. Passage through Gate No. 3 is limited to holders of the coded cards. Approximately 300 such cards have been issued and approximately 70 percent of these cards are held by civilians. The priority used for issuance of cards is as follows: 1) military personnel living on the western boundaries of the base; 2) retired military personnel living along the western perimeter of the base; 3) civilian personnel who reside along the western perimeter of the base and work on the base; and 4) civilian personnel working in the city of Cheyenne and living on the western perimeter of the base.

Gate No. 4 is a special-purpose locked gate located in the northeast area near the horse stables. The gate provides access to a fire road around the base perimeter and does not provide access to areas outside the base boundaries.

Gate No. 5 is located on the eastern boundary near the WHD offices. The gate is a special-purpose gate which is used for the movement of the stage transporter and on occassion the transportation of horses from the stables. This gate is normally locked.

Gates No. 6 and No. 7 are locked gates located in the north and northwest perimeter of the base. Gate No. 6 is located diagonally opposite the water treatment plant and Gate No. 7 is located in the north opposite the Experimental Research Station at Horse Creek Road. Both gates are closed and are used for special purposes by either the Air Force or the Experimental Research Station.

Traffic volume data for 1982, obtained from the WHD, show Gate No. 1 to have a total average weekday volume of 12,500 vehicles. In comparison, Gate No. 2 has a total average weekday volume of about 2,000 vehicles. The analysis done for this study shows that the peak 15-minute period for both queue and delay occurs from 7:15 AM to 7:30 AM at both Gate No. 1 and Gate No. 2.

At Gate No. 1, the maximum queue of 15 vehicles in 2 lanes extends 200 feet easterly on Randall Avenue. This queue at times extends into the Randall Avenue/Interstate 25 interchange. Total delay during the 15-minute peak period is 1,620 vehicle-seconds, with an average delay per approach vehicle of 6.3 seconds, and an average delay per stopped vehicle of 52.3 seconds. The percent of approach vehicles stopped is 12 percent.

At Gate No. 2, the maximum queue of 3 vehicles in 2 lanes extends 50 feet easterly on Missile Drive. Total delay during the 15-minute peak period is 45 vehicle-seconds with an average delay per approach vehicle near zero seconds, and an average delay per stopped vehicle of 15 seconds. The percent of approach vehicles stopped is 2.1 percent.

Queuing and delaying studies were not conducted at Gates No. 3 and No. 4 because they experience very low traffic volumes.

2.6.1.1.1.2 Town of Pine Bluffs

The town of Pine Bluffs, an incorporated community in southeastern Laramie County, has an estimated 1980 population of 1,077. The town is located in a rural area along Interstate 80 next to the Nebraska state border. A map of Pine Bluffs' roadway network is shown in Figure 2.6.1-18.

Access from Interstate 80 is via Interstate Business 80 and U.S. 30 (Federal-Aid Secondary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of a small grid system of several two-lane, two-way paved roads controlled by stop signs. State Highway 215 (Federal-Aid Secondary) intersects Interstate 80 Business and U.S. 30 on the northern side of town. County Road 164 underpasses Interstate 80 on the southern side of town and follows Beech Avenue to its intersection with the U.S. 30/Interstate Business Route.

2.6.1.1.1.3 Town of Burns

The town of Burns is an incorporated community with an estimated 1980 population of 268 located in a rural area east of the city of Cheyenne and approximately 2 miles north of Interstate 80. A map of Burns' roadway network is shown in Figure 2.6.1-19. Access for Interstate 80 is via State Highway 213 (Federal-Aid Secondary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of Highway 213 (Main Street) and several paved and gravel roads. The roads intersecting Main Street are controlled by stop signs.

2.6.1.1.1.4 Town of Albin

The town of Albin is an incorporated community with an estimated 1980 population of 128 persons located in a rural area northeast of the city of Cheyenne near the Nebraska border. The town is situated approximately 16 miles east of U.S. 85 (Federal-Aid Primary) and about 17 miles north of Interstate 80. A map of Albin's roadway network is shown in Figure 2.6.1-20. Access from U.S. 85 is via State Highway 215 (Federal-Aid Secondary). The local roadway network consists of State Highway 216 and several paved and gravel roads. State Highway 216 intersects State Highway 215 on the eastern side of the town.

2.6.1.1.1.5 Carpenter

Carpenter is an unincorporated community with an estimated 1983 population of 102 persons located in a rural area southeast of the city of Cheyenne approximately 8 miles south of the Interstate 80. Access from Interstate 80 is via State Highway 214 (Federal-Aid Secondary) which is a two-lane, two-way,

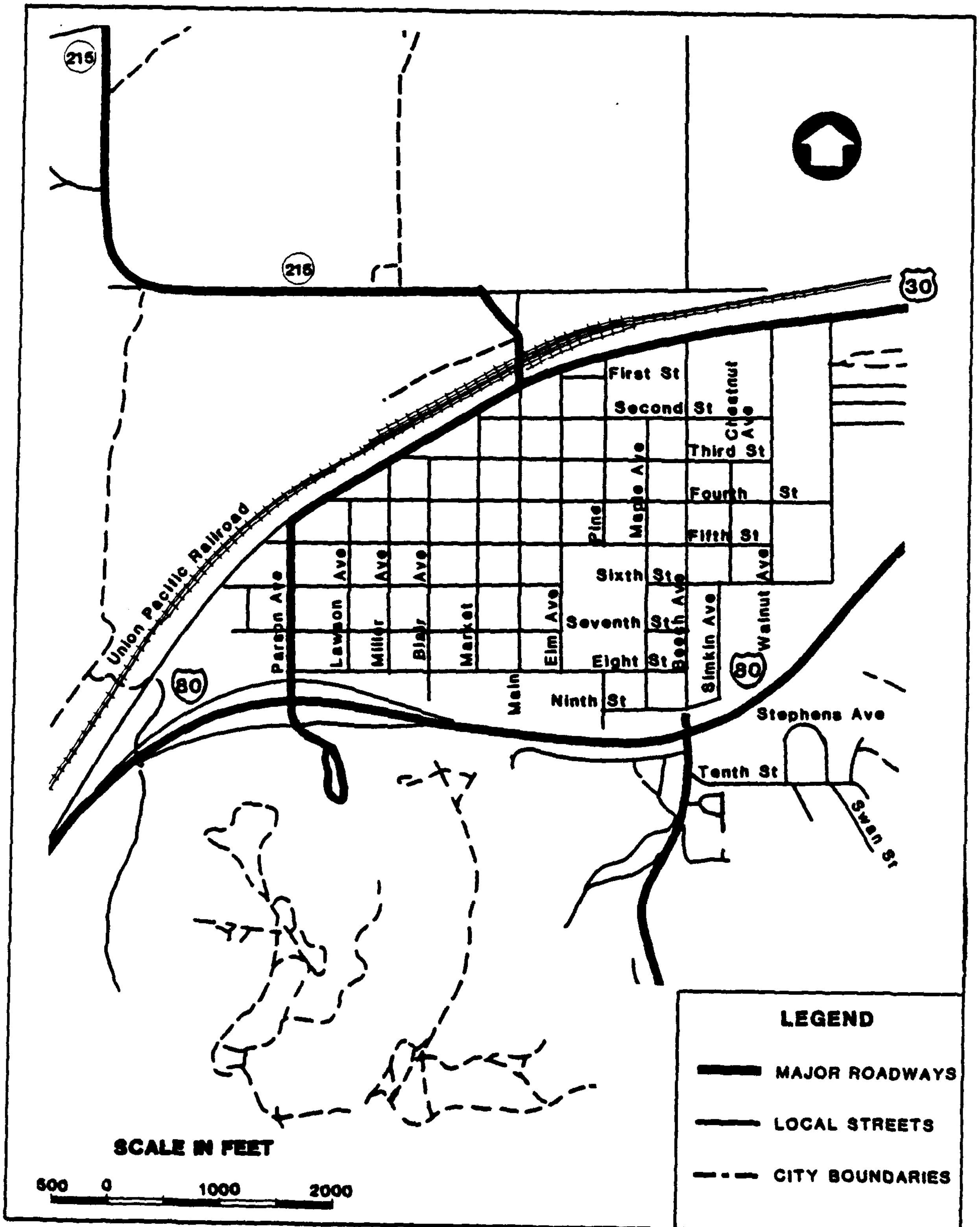


FIGURE 2.6.1-18 TOWN OF PINE BLUFFS ROADWAY NETWORK

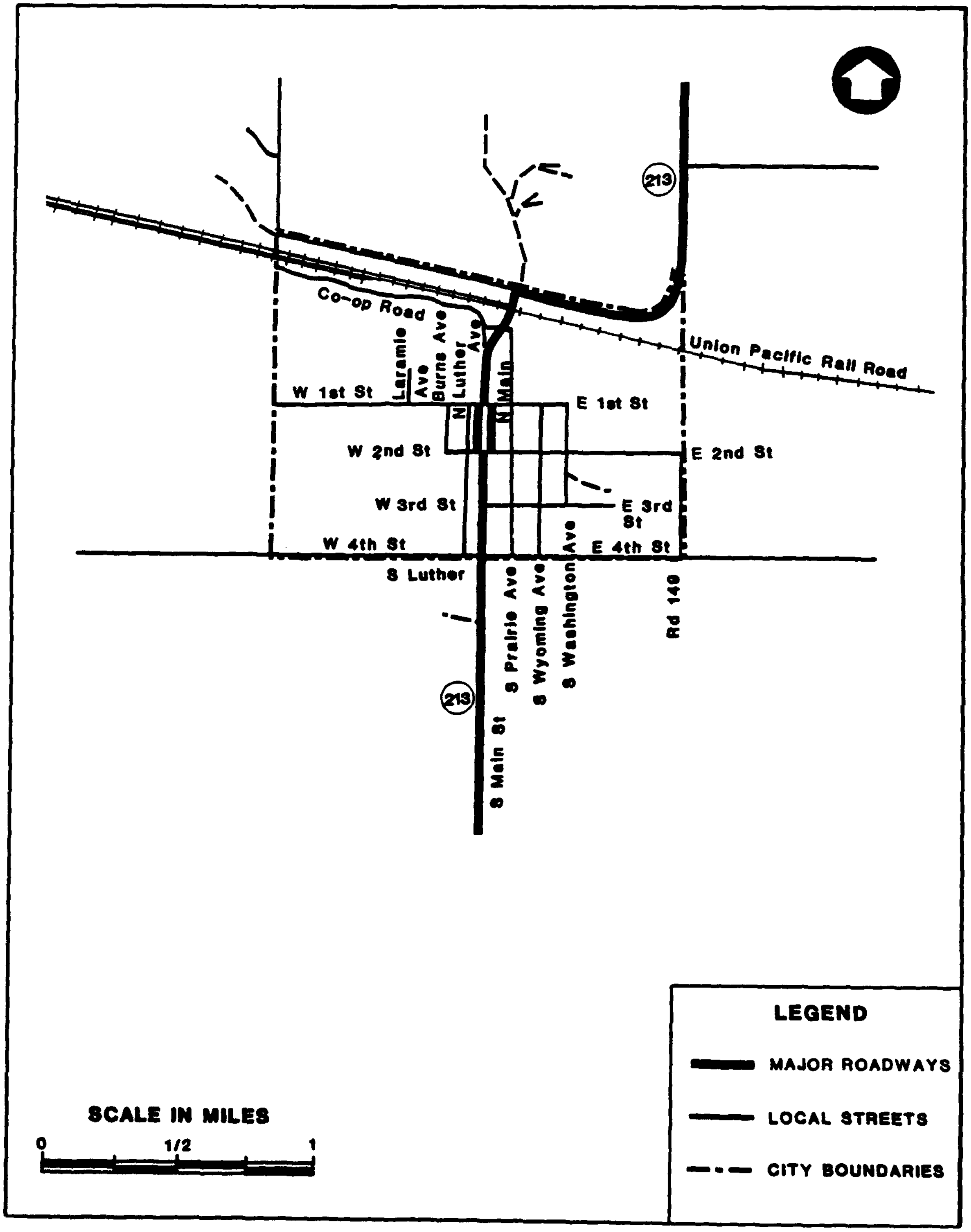


FIGURE 2.6.1-19 TOWN OF BURNS ROADWAY NETWORK

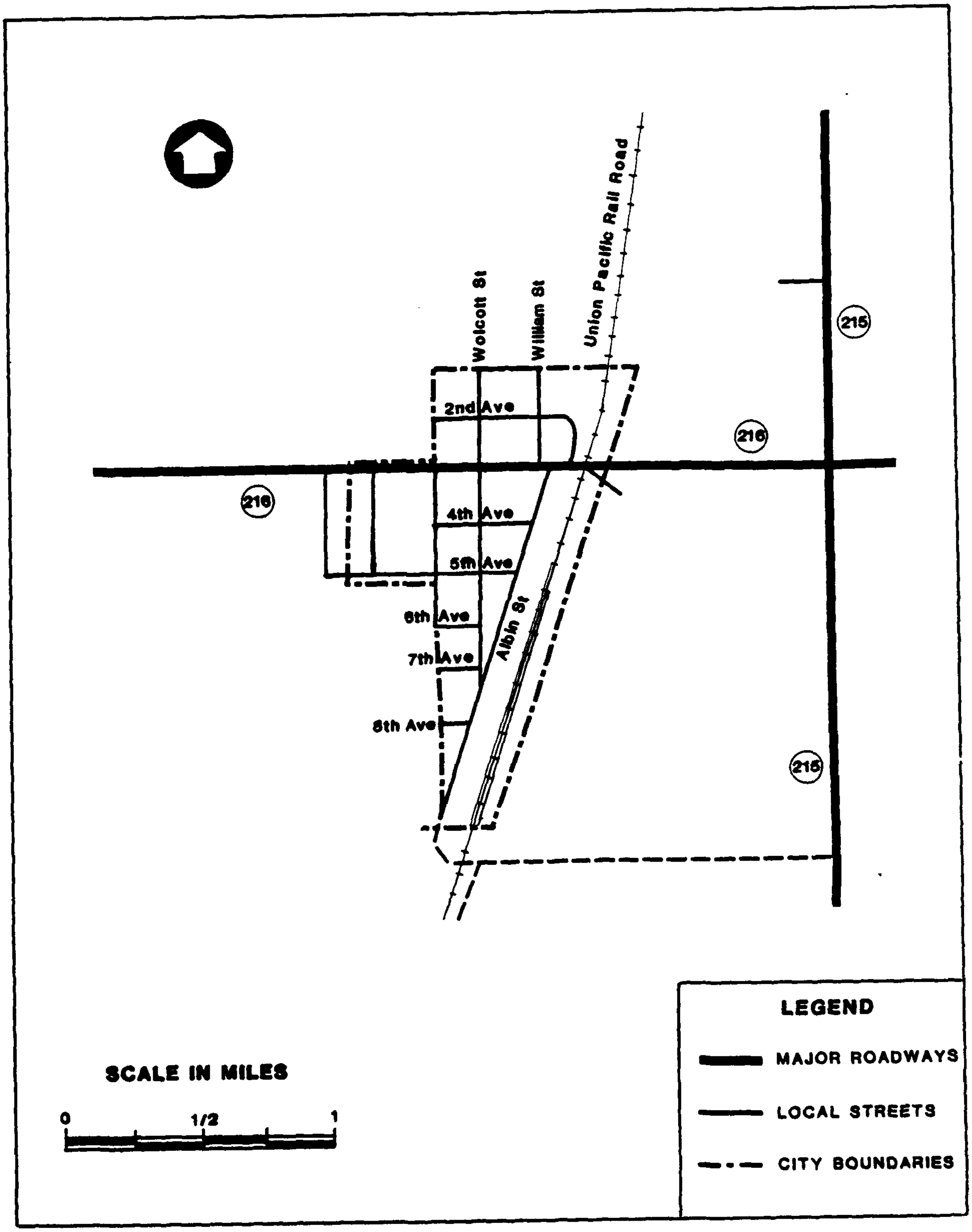


FIGURE 2.6.1-20 TOWN OF ALBIN ROADWAY NETWORK

high-type paved road. The local roadway network consists of Highway 214 and several paved and gravel roads. County Road 203 intersects Highway 214 on the southern side of the community.

2.6.1.1.1.6 Egbert

Egbert is an unincorporated community located in a rural area east of Cheyenne and approximately 1 mile north of Interstate 80. Access from Interstate 80 is via County Road 154 which is a two-lane, two-way, low-type paved road. The local roadway network consists of County Roads 154 and 212 and a few intersecting gravel roads.

2.6.1.1.1.7 Hillsdale

Hillsdale is an unincorporated community located in a rural area east of Cheyenne and approximately 4 miles north of Interstate 80. Access from Interstate 80 is via County Road 142 (Hillsdale Road) which is a 2-lane, two-way paved road. The local roadway network consists of County Roads 142 and 143 and a few intersecting gravel roads.

2.6.1.1.2 Platte County, Wyoming

2.6.1.1.2.1 Town of Wheatland

The town of Wheatland is an incorporated urban area with an estimated 1980 population of 5,816 located in the central portion of Platte County, 70 miles north of Cheyenne and immediately east of Interstate 25. A map of Wheatland's roadway network is shown in Figure 2.6.1-21. Access from Interstate 25 in the center of town is via Interstate Business 25 which is a two-lane, two-way, high-type paved road. The local roadway network consists of urban principal arterials, minor arterial streets, collector streets, and local streets arranged in a grid system. Several intersections are controlled by traffic signals. State Highways 310, 312, and 316 (all Federal-Aid Secondaries) also provide access to the town and the Central Business District. Traffic volumes for the major roadways and intersections are shown in Figure 2.6.1-21.

2.6.1.1.2.2 Town of Guernsey

The town of Guernsey is an incorporated community with an estimated 1980 population of 1,512 persons, located in the northeastern portion of the county on the North Platte River. Guernsey is situated in a rural area 98 miles north of Cheyenne and approximately 16 miles east of Interstate 25. Access from Interstate 25 is via U.S. 26 (Federal-Aid Primary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of U.S. 26 and several paved roads arranged in a grid system. State Highways 317 and 318 (both Federal-Aid Secondaries) intersect U.S. 26 on the western and eastern sides of the town respectively.

2.6.1.1.2.3 Town of Chugwater

The town of Chugwater is an incorporated community with an estimated 1980 population of 282, persons located in a rural area in the southeastern portion of the county immediately east of Interstate 25. A map of Chugwater's roadway network is shown in Figure 2.6.1-22. Access from Interstate 25 into the

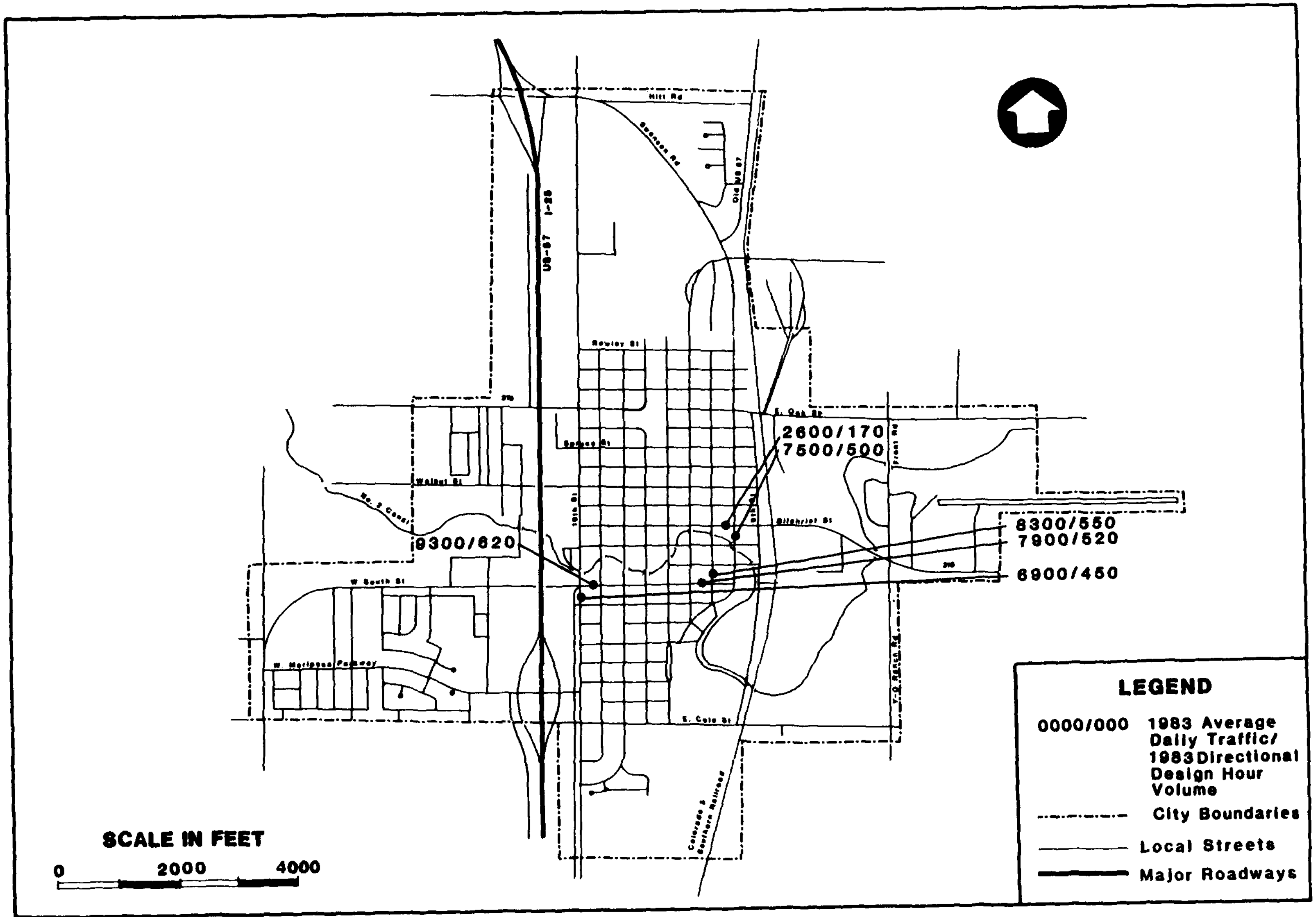


FIGURE 2.6.1-21 ROADWAY NETWORK AND 1983 ESTIMATED TRAFFIC VOLUMES IN TOWN OF WHEATLAND

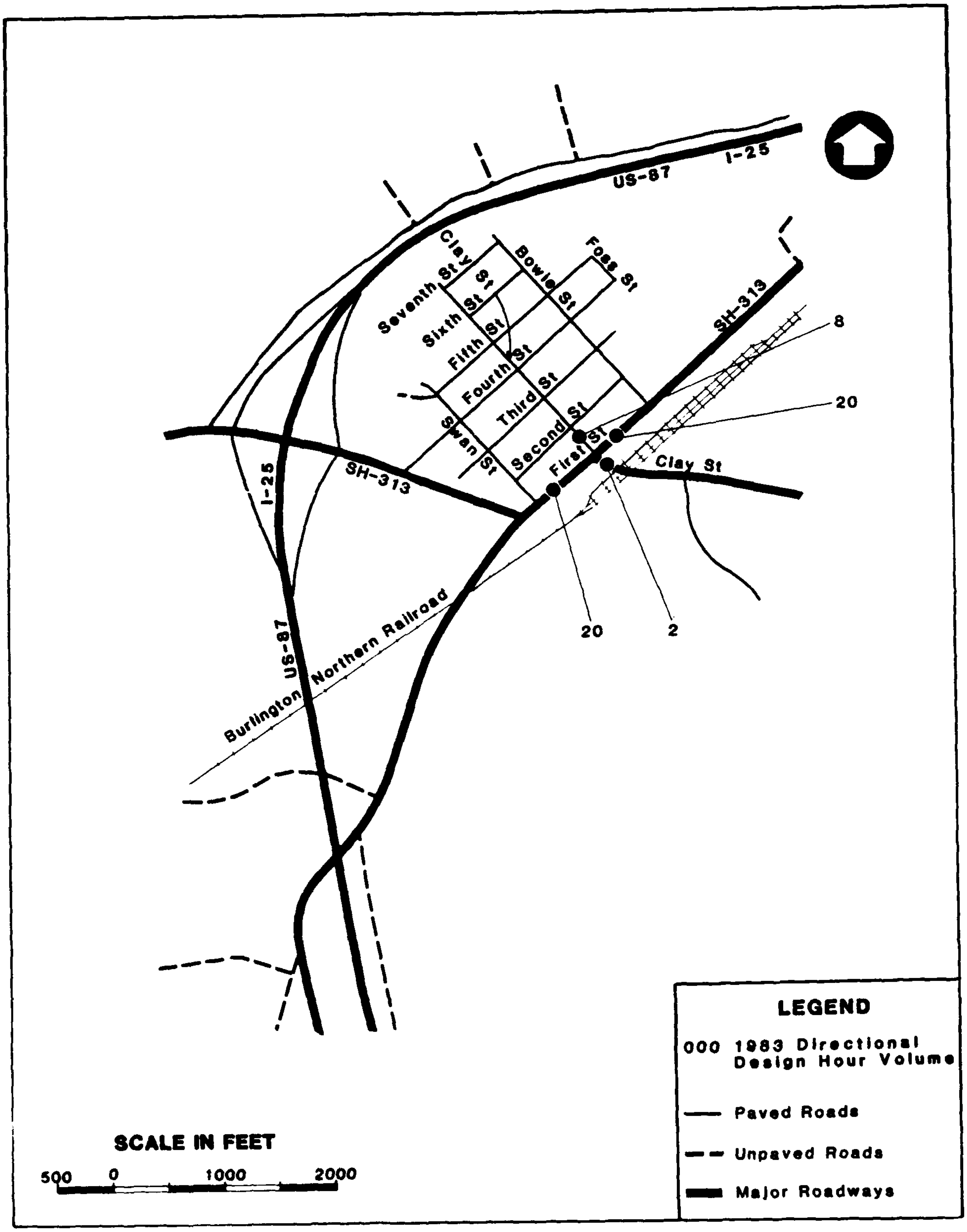


FIGURE 2.6.1-22 ROADWAY NETWORK AND 1983 ESTIMATED TRAFFIC VOLUMES IN TOWN OF CHUGWATER

center of the community is via State Highway 32 (Federal-Aid Primary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of State Highway 321 and several gravel roads. State Highway 313 (Federal-Aid Secondary) is a two-lane, two-way, high-type paved road and intersects Highway 321 on the eastern side of the town. Traffic volumes for the major roadways and intersections are shown on Figure 2.6.1-22.

2.6.1.1.3 Goshen County, Wyoming

2.6.1.1.3.1 Town of Torrington

The town of Torrington, an incorporated community with an estimated 1980 population of 5,400 is located in the eastern-central portion of Goshen County, northwest of Scottsbluff, Nebraska, and at the junction of U.S. 85 and U.S. 26 (both Federal-Aid Primaries). A map of Torrington's roadway network is shown in Figure 2.6.1-23. The local roadway network consists of urban principal arterials, minor arterial streets, collector streets, and local streets arranged in a grid system. Several intersections are controlled by traffic signals. U.S. 85 and U.S. 26 join at the southern end of the Central Business District. The major roadways and intersections are shown on Figure 2.6.1-23.

2.6.1.1.3.2 Town of Lingle

The town of Lingle, an incorporated community with an estimated 1980 population of 475, is located in a rural area 10 miles northwest of Torrington in the immediate vicinity of the junction of U.S. 85 and U.S. 26 (Federal-Aid Primaries). A map of Lingle's roadway network is shown in Figure 2.6.1-24. The local roadway network consists of U.S. 85, U.S. 26, and several paved and gravel roads. State Highways 156 and 157 (Federal-Aid Secondaries) intersect at the southern end of the town.

2.6.1.1.3.3 Town of Fort Laramie

The town of Fort Laramie is an incorporated community with an estimated 1980 population of 356 persons located in a rural area 20 miles northwest of Torrington on U.S. 26 (Federal-Aid Primary). The local roadway network consists of U.S. 26, State Highway 160 (Federal-Aid Secondary), and a few gravel roads.

2.6.1.1.3.4 Town of La Grange

The town of La Grange is an incorporated community with an estimated 1980 population of 232 located in a rural area approximately 40 miles northeast of Cheyenne and approximately 4 miles east of U.S. 85 (Federal Aid Primary). Access from U.S. 85 is via State Highway 15 (Federal-Aid Secondary) which is a two-lane, two-way, low-type paved road. The local roadway network consists of Highway 151 and several gravel roads. The roads intersecting Highway 151 are controlled by stop signs.

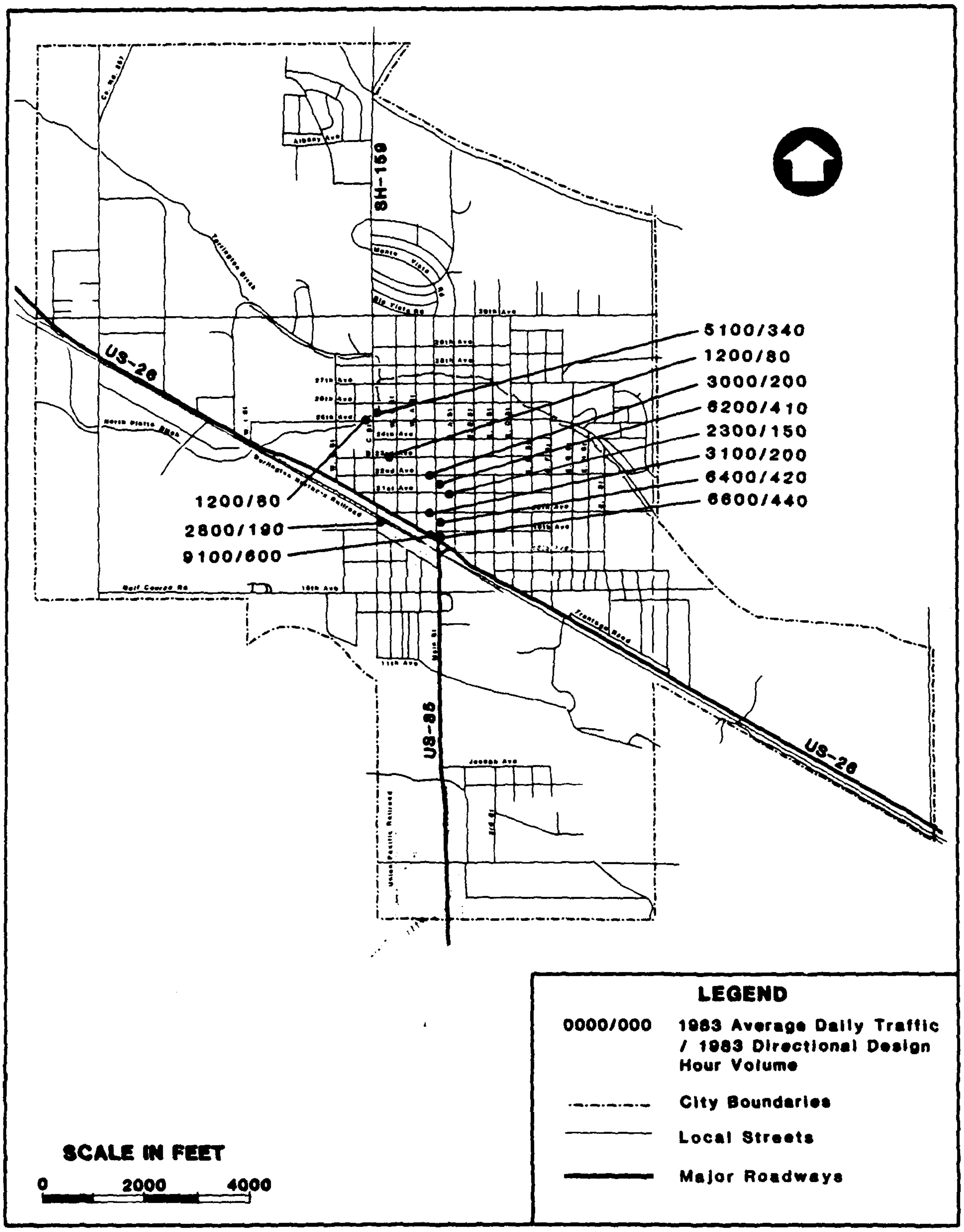


FIGURE 2.6.1-23 ROADWAY NETWORK AND 1983 ESTIMATED TRAFFIC VOLUMES IN TOWN OF TORRINGTON

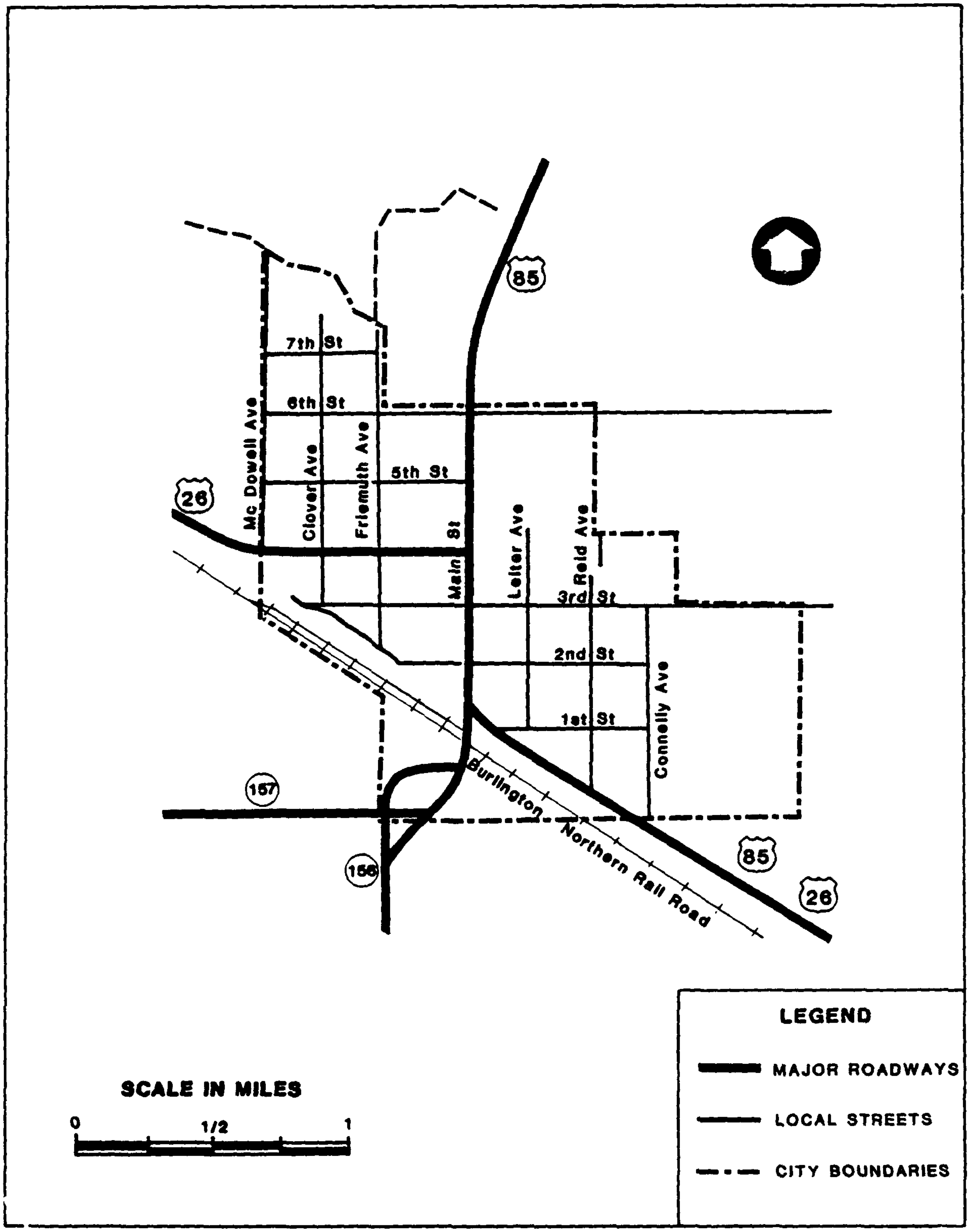


FIGURE 2.6.1-24 TOWN OF LINGLE ROADWAY NETWORK

2.6.1.1.3.5 Town of Yoder

The town of Yoder is an incorporated community with an estimated 1980 population of 110 persons situated in a rural area approximately 15 miles southwest of Torrington and approximately 2 miles west of U.S. 85 (Federal-Aid Primary). Access from U.S. 85 is via State Highway 152 (Federal-Aid Secondary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of Highway 152 and several paved and gravel roads. State Highway 154 (Federal-Aid Secondary) intersects and joins with Highway 152 on the western side of the town.

2.6.1.1.3.6 Hawk Springs

Hawk Springs is an unincorporated community situated in a rural area northeast of Cheyenne and immediately east of U.S. 85 (Federal-Aid Primary). The local roadway network consists of U.S. 85 and a few gravel roads. The roads intersecting U.S. 85 are controlled by stop signs.

2.6.1.1.3.7 Huntley

Huntley is an unincorporated community located south of Torrington and approximately 7 miles east of U.S. 85 (Federal-Aid Primary). Access from U.S. 85 is via State Highway 161 (Federal-Aid Secondary) which is a two-lane, two-way, high-type paved road. The local roadway network consists of State Highways 161 and 92 and several gravel roads.

2.6.1.1.3.8 Fort Laramie National Monument

Fort Laramie National Monument is located southwest of Fort Laramie and approximately 2 miles west of U.S. 26 (Federal-Aid Primary). Access from U.S. 26 is via State Highway 160 (Federal-Aid Secondary) which is a two-lane, two-way, low-type paved road. The local roadway network consists of a few paved and gravel roads.

2.6.1.1.3.9 Veteran

Veteran is an unincorporated community situated in a rural area 15 miles southwest of Torrington and approximately 10 miles west of U.S. 85 (Federal-Aid Primary). Access from U.S. 85 is via State Highways 152 and 154 (Federal-Aid Secondaries) which are two-lane, two-way, high-type paved roads. The local roadway network consists of State Highway 154 and a few gravel roads.

2.6.1.1.4 Kimball County, Nebraska

2.6.1.1.4.1 City of Kimball

The city of Kimball is an incorporated community with an estimated 1980 population of 3,120. The city is situated in a rural area located 40 miles west of Sidney and approximately 1 mile north of Interstate 80. A map of Kimball's roadway network is shown in Figure 2.6.1-25. Access from Interstate 80 is via State Highway 71 (Federal-Aid Primary) which is a two-lane, two-way paved road. The local roadway network consists of U.S. 30 (Federal-Aid Primary and Secondary), State Highway 71, and several paved and gravel roads. U.S. 30 intersects State Highway 71 in the middle of the city

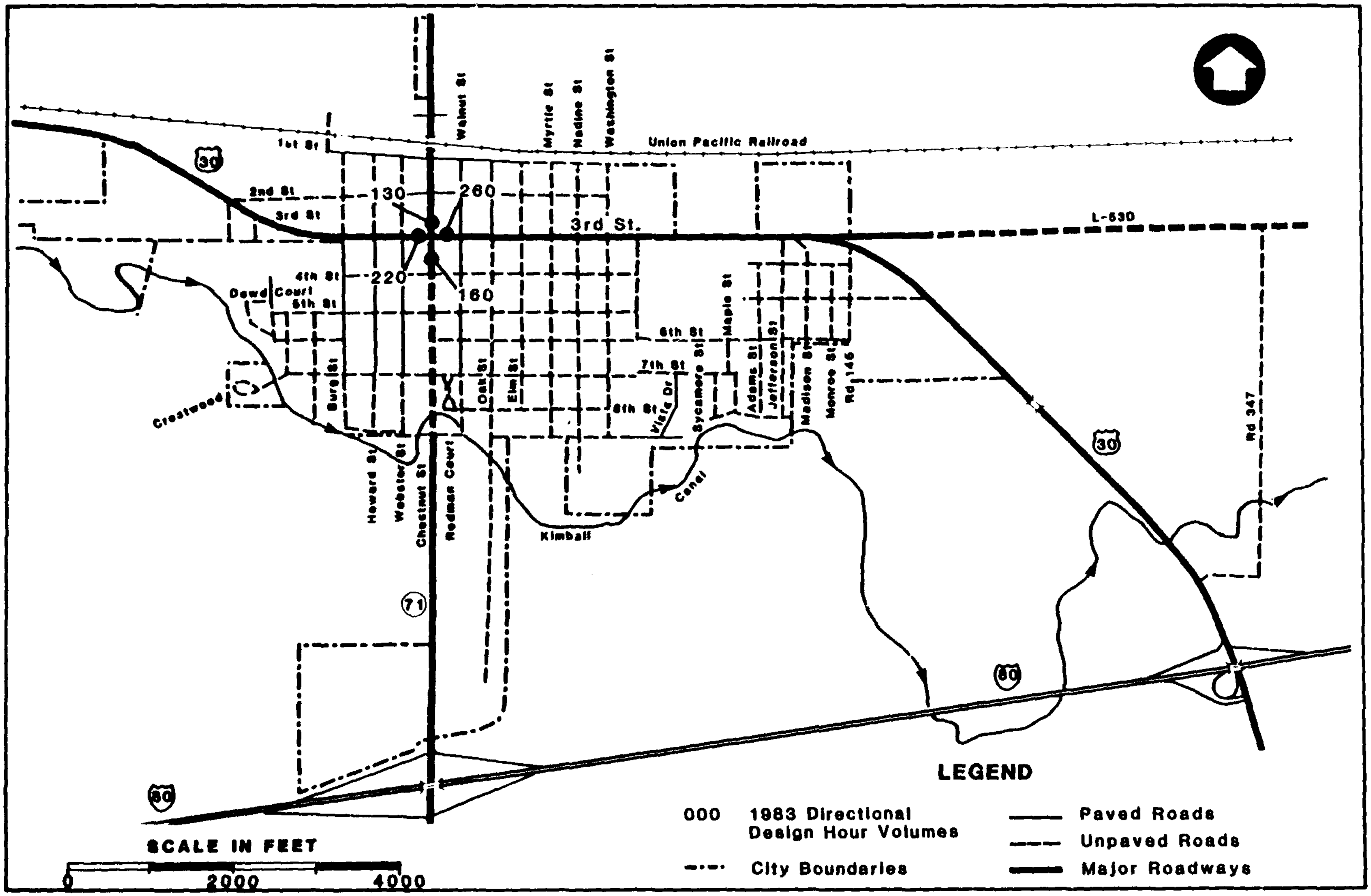


FIGURE 2.6.1-25 ROADWAY NETWORK AND 1983 ESTIMATED TRAFFIC VOLUMES IN CITY OF KIMBALL

and the intersection is controlled by traffic signals. Traffic volumes for the major roadways and intersections are shown on Figure 2.6.1-25. The Union Pacific Railroad traverses the city on the north side. The State Highway 71 underpass has a low clearance (13 feet 6 inches) at the northern end of the Central Business District. An at-grade crossing is located along Jackson Street and County Road 245 on the eastern side.

2.6.1.1.4.2 Village of Bushnell

The village of Bushnell is an incorporated community with an estimated 1980 population of 186 persons located in a rural area 12 miles west of Kimball, and approximately 3 miles north of Interstate 80. Access from Interstate 80 is via State Highway L-53C (Federal-Aid Secondary) which is a two-lane, two-way paved road. The local roadway network consists of U.S. 30 (Federal-Aid Secondary), State Highway L-53C, and a few gravel roads. U.S. 30 intersects State Highway L-53C at the southern end of the village.

2.6.1.1.5 Banner County, Nebraska

2.6.1.1.5.1 Harrisburg

Harrisburg is an unincorporated community situated in a rural area about 20 miles south of Scottsbluff. The community is located approximately 4 miles west of State Highway 71 (Federal-Aid Primary), which is a two-lane, two-way paved road. Access from State Highway 71 is via State Highway S-4A (Federal-Aid Secondary) which is a two-way, two-lane, low-type paved road. The local roadway network consists of State Highway S-4A and a few gravel roads.

2.6.1.1.6 Scotts Bluff County, Nebraska

2.6.1.1.6.1 City of Scottsbluff

Scottsbluff, an incorporated urban community with an estimated 1980 population of 14,156, is located on the northern bank of the North Platte River. U.S. 26 and State Highway 71 (Federal-Aid Primaries) intersect on the northwestern side of the city. State Highway 29 (Federal-Aid Primary) provides access to the city from the western side. A map of Scottsbluff's roadway network is shown in Figure 2.6.1-26. The local roadway network consists of two-lane and four-lane principal arterials, minor arterials, and local streets arranged in a grid system. Several intersections are controlled by traffic signals including seven signals along State Highway Business 71 (Broadway and 27th Street) and five signals along U.S. 26. The Central Business District has a mall area along Broadway from 16th to 19th Streets. The mall consists of street corner planted peninsulas which delineate the parallel parking areas.

2.6.1.1.6.2 City of Gering

The city of Gering, with an estimated 1980 population of 7,760, is an incorporated urban place situated in the central portion of the county along the North Platte River. The city is located south of Scottsbluff and is served by State Highways 71 and 92 (Federal-Aid Primaries). A map of Gering/Terrytown's roadway network is shown in Figure 2.6.1-27. The local roadway network consists of two-lane and four-lane arterials, collectors, and several city streets arranged in a grid system. Several intersections are

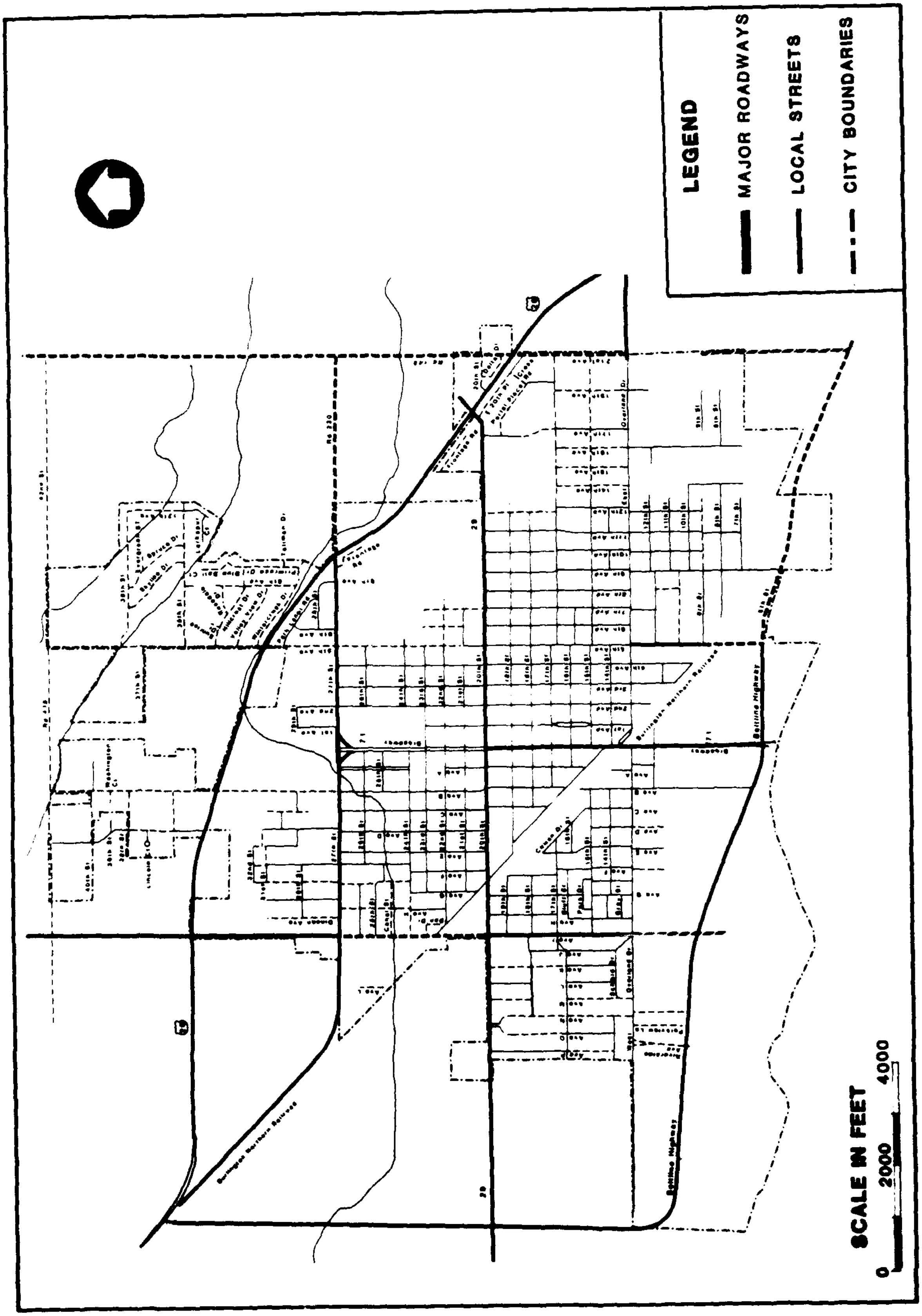


FIGURE 2.6.1-26 CITY OF SCOTTSBLUFF ROADWAY NETWORK

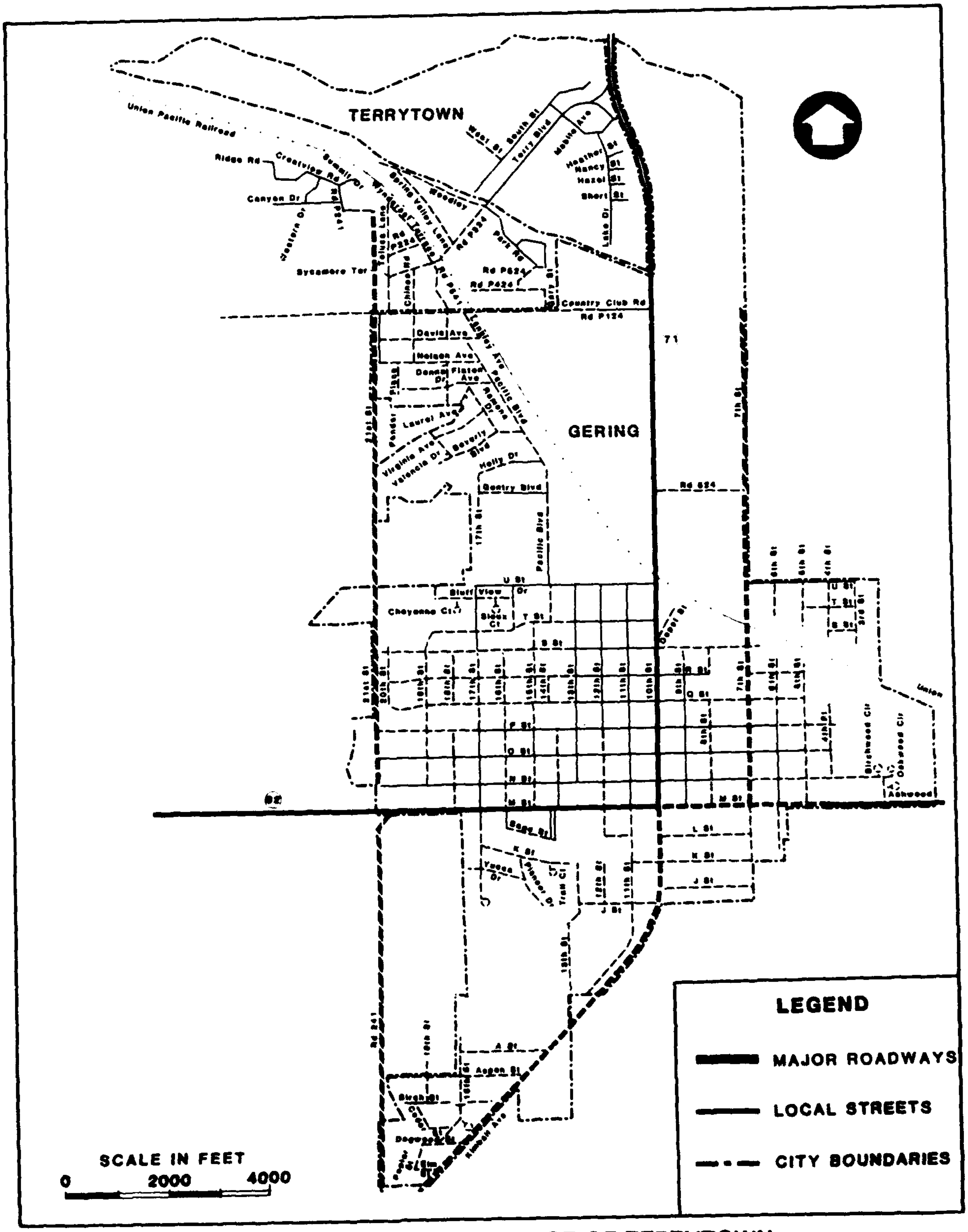


FIGURE 2.6.1-27 CITY OF GERING AND VILLAGE OF TERRYTOWN ROADWAY NETWORKS

controlled by traffic signals including nine signals along State Highway Business 71 (10th Street). Major pedestrian crossings are controlled by pedestrian signals. Diagonal parking is provided in the Central Business District. The UP rail lines are situated diagonally across the north and east sides of Gering. State Highway 71 (10th Street) underpasses the railroad just north of U Street.

2.6.1.1.6.3 City of Mitchell

The city of Mitchell is an incorporated community with an estimated 1980 population of 1,984. The city is located in the northwestern portion of the county in a rural area 10 miles northwest of Scottsbluff on U.S. 26 (Federal-Aid Primary). A map of Mitchell's roadway network is shown in Figure 2.6.1-28. State Highway 29 (Federal-Aid Primary and Secondary) which is a two-lane, two-way, low-type paved road, intersects with U.S. 26 in the middle of the city. The local roadway network consists of U.S. 26 (Broadway), State Highway 29 (19th Avenue), and several paved local streets. One intersection along Broadway is controlled by traffic signals.

2.6.1.1.6.4 Village of Morrill

The village of Morrill is an incorporated community with an estimated 1980 population of 1,138 and is situated in a rural area located about 15 miles northwest of Scottsbluff on U.S. 26 (Federal-Aid Primary). A map of Morrill's roadway network is shown in Figure 2.6.1-29. State Highways S-79B and L-79D (Federal-Aid Secondaries), which are two-lane, two-way, low-type paved roads, intersect with U.S. 26 on the eastern and western sides of the village, respectively. The local roadway network consists of U.S. 26 (Webster Street), State Highways S-79B and L-79D, and several paved local streets.

2.6.1.1.6.5 Village of Terrytown

The village of Terrytown is an incorporated community with an estimated 1980 population of 727 persons. The village is situated between Scottsbluff and Gering on the southern bank of the North Platte River. The local roadway network, shown in Figure 2.6.1-27 interconnects with the street and highway system of the urban area and consists of arterials, collectors, and several paved streets including State Highway Business 71 (Federal-Aid Primary).

2.6.1.1.6.6 Village of Lyman

The village of Lyman is an incorporated community with an estimated 1980 population of 549 persons, and is located about 5 miles south of U.S. 26 along the Wyoming border. Access to the community from U.S. 26 (Federal-Aid Primary) is via State Highway L-79C (Federal-Aid Primary) which is a two-lane, two-way, low-type paved road. State Highway 92 (Federal-Aid Primary) which is also a two-lane, two-way, low-type paved road intersects State Highway L-79C at the southerly edge of the village. The local roadway network consists of State Highways 92 and L-79C and several gravel roads.

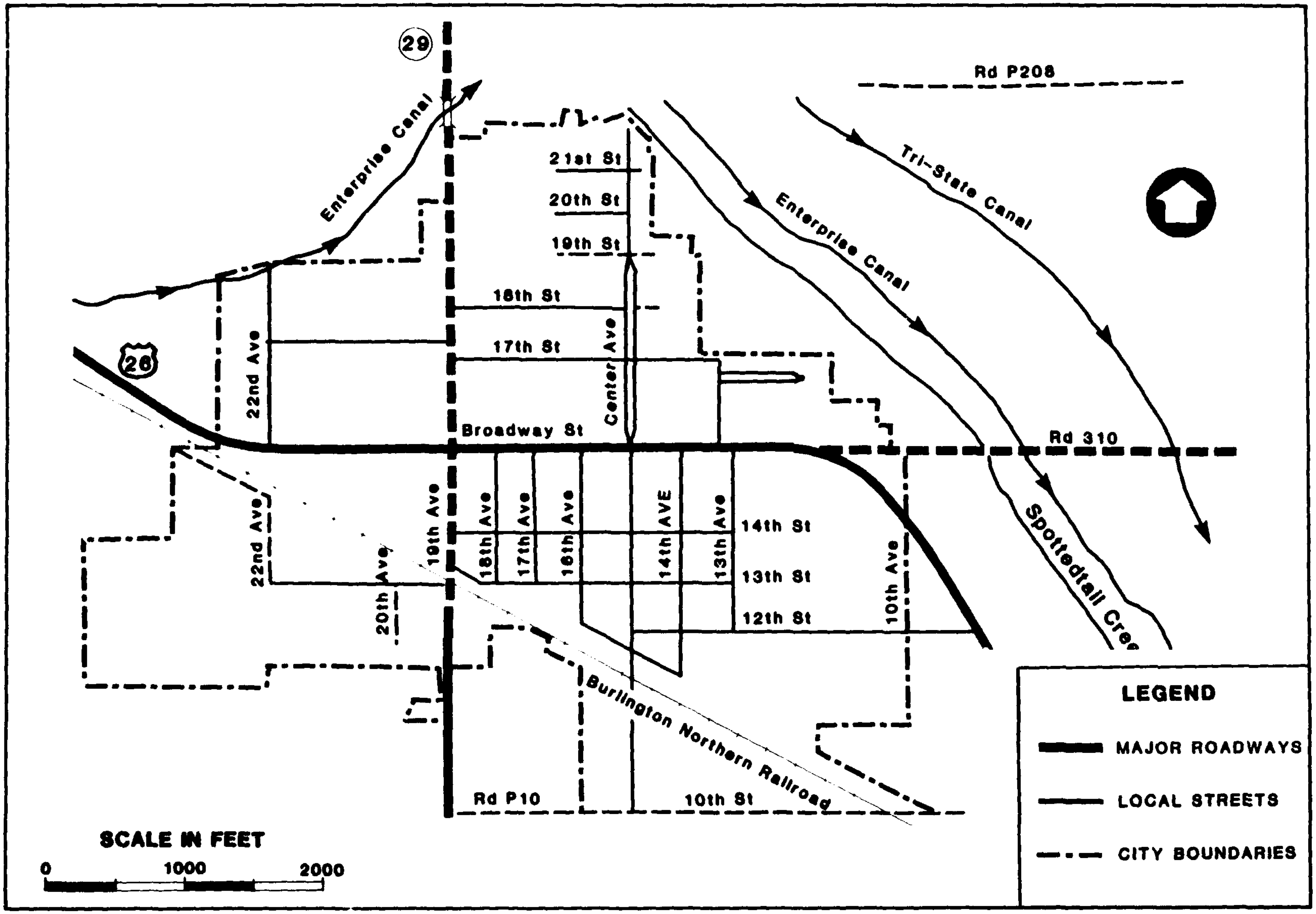


FIGURE 2.6.1-28 CITY OF MITCHELL ROADWAY NETWORK

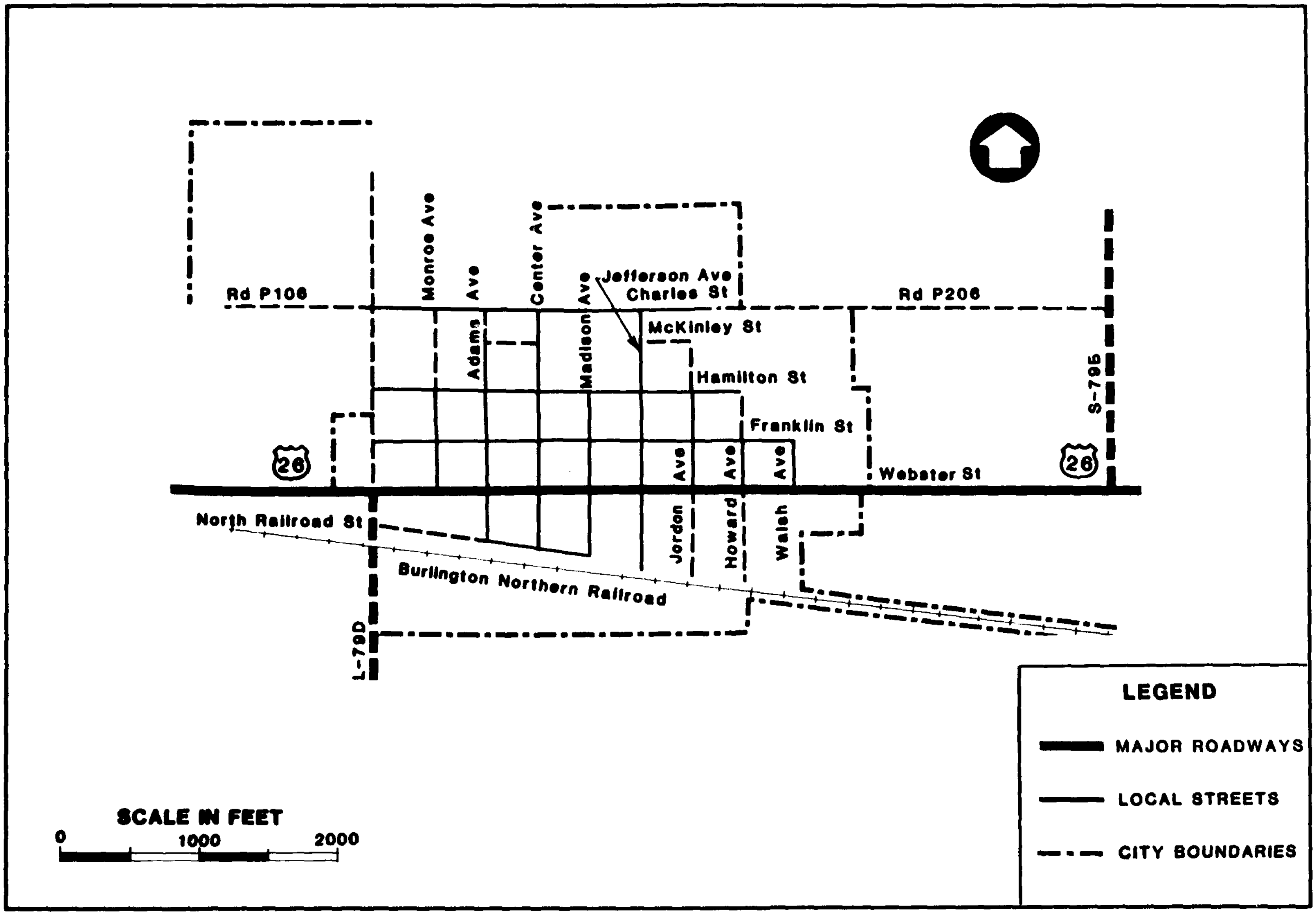


FIGURE 2.6.1–29 VILLAGE OF MORRILL ROADWAY NETWORK

2.6.1.2 Rural Areas

Many rural roads within the ROI are currently used for Minuteman operations. The segments which are Minuteman T/E routes are described below for each county. The majority of these roads are lightly traveled, gravel surfaced, farm access roads critical to the local agricultural communities as market routes.

The condition of these roads varies considerably depending on the date of construction, age of the structure, maintenance operations, wind erosion, abuse during wet weather, and many other factors. According to state and local authorities, some roads are hazardous during snowstorms, on occasion necessitating rescue operations by state and county personnel. During spring thaws, some roads are nearly impassable and become badly damaged when used under these conditions.

The physical conditions of the affected roads were determined by the inventory described in Section 2.5.1.1.3. This inventory was limited to presently designated Minuteman T/E routes. Additional road inventory information was collected for other project-related rural roads in the same way as for T/E routes. This information was used to study the possibilities of providing improvements to the current T/E network.

The T/E routes have a total mileage of 970 miles and extend into Laramie, Platte, and Goshen counties in Wyoming and Kimball and Banner counties in Nebraska.

During the inventory, roadway and shoulder surface types were classified using the Wyoming State Classification System. The surface classes identified are briefly described in Table 2.6.1-9 and detailed definitions appear in Table 2.5.1-3.

Table 2.6.1-9

WYOMING STATE CLASSIFICATION SYSTEM
SURFACE CLASS DESCRIPTION

Surface Class	
C	Graded and Drained Earth Road
D	Soil Surfaced Road
E	Gravel or Stone Road
E-1	Not Graded & Drained
E-2	Graded & Drained
G	Mixed Bituminous Road
G-1	Low-Type
G-2	High-Type
H	Bituminous Penetration Road
H-1	Low-Type
H-2	High-Type
I	Bituminous Concrete Road
J	Portland Cement Concrete Road

An assessment of the structural properties of gravel and soil surfaced roads (C, D, and E-2 class roads) was made with the Clegg Impact Device and using established correlations between Clegg Impact Values (CIV) and the California Bearing Ratio (CBR).

A summary of the total mileage of the T/E route system by surface classification and by total surface width is presented in Table 2.6.1-10. The total surface width includes the width of both the roadway and the structural shoulders. Information on the total number of structures throughout the T/E route system is also presented in Table 2.6.1-10.

2.6.1.2.1 Laramie County, Wyoming

The Cheyenne metropolitan area is the hub of the transportation system in Laramie County. As shown in Figure 2.6.1-1, Regional Highways, Interstate 25 and Interstate 80 traverse the county north-south and east-west, respectively, and intersect in the southwestern portion of the urban area. U.S. 30 and U.S. 85 (Federal-Aid Primaries) provide direct access to the city of Cheyenne. U.S. 85 also provides linkage with the northeastern portion of the county. In the more developed parts of the county, a series of state highways (mostly Federal-Aid Secondaries) provide interconnection with the major arterials and access to the smaller urban areas. This high-type paved roadway network is augmented by the remaining county roads (mostly gravel) which provide access throughout the developed portions of the county. The functional classification provided by each of these roads is depicted in Figure 2.6.1-30.

The Interstates and U.S. 85 provide the arterial framework, while the state highways and key county roads perform collector roles. This high-type paved roadway network is fed by a dense grid of low-type paved and gravel roads in the southeastern section of the county and a more curvilinear pattern elsewhere.

Most of the roadway network in the northern and eastern parts of the county are used for Minuteman operations. The roads and their 1983 total traffic volumes are depicted in Figure 2.6.1-31, Laramie County - Project-Related Roads.

Figure 2.6.1-32 shows T/E routes in Laramie County and the numbering system that was developed to identify the T/E routes for the road inventory survey. Table 2.6.1-11 presents a summary of existing physical conditions of these T/E routes. This summary includes surface type and structural classification as well as information on associated roadway elements.

The primary T/E routes in Laramie County are Interstate 25, from the junction with Interstate 80 to the border with Platte County (38 miles); Interstate 80 from the junction with Interstate 25 to the border of Kimball County, Nebraska (43 miles); and U.S. 85 from the junction with Interstate 25 to the border of Goshen County (39 miles). These are supplemented by State Route 216 from U.S. 85 to Albin (17 miles), State Route 215 from Albin to Pine Bluffs (17 miles), State Route 213 from Interstate 80 to Burns (3 miles), and some 190 miles of county roads to the north and east of Cheyenne.

Table 2.6.1-10

ALL COUNTIES-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	42.10
D	Soil Surface Roads	157.35
E1	Gravel or Stoned Roads Not Graded and Drained	3.70
E2	Gravel or Stoned Roads Graded and Drained	103.68
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	4.12
G2	High-Type Mixed Bituminous Roads	426.41
H1	Low-Type Bituminous Penetration Roads	40.10
H2	High-Type Bituminous Penetration Roads	21.59
I	Bituminous Concrete	1.14
J	Portland Cement Concrete Roads	169.71
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD	969.90[a]

Other Elements		Structures	
Description	Total Number	Description	Total Number
Substandard Curves[1]	62	Bridges	224
Buried Pipeline	42	Box Culverts	157
Overhead Cable	357	Reinforced Concrete Pipe	526
Buried Cable	22	Corrugated Metal Pipe	1,077
Silo Entrance Road	111	Metal Pipe Arches	111
Railroad Track	22	R.C. Arch Culverts	23
Overhead Sign	23	Cattle Guards	105

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

a This figure includes mileage recorded on both sides (directions) of the Interstate System.

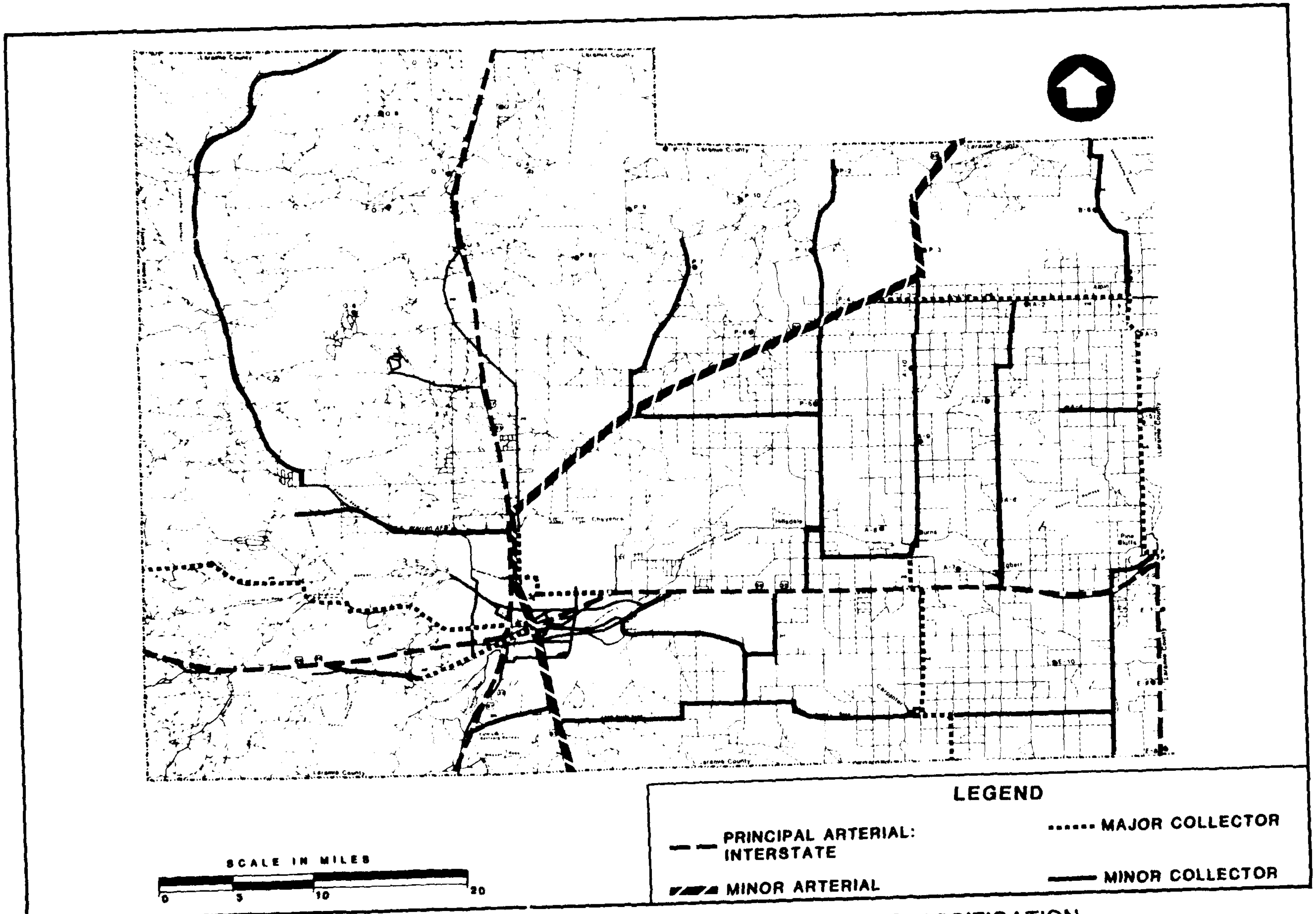


FIGURE 2.6.1-30 LARAMIE COUNTY - NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

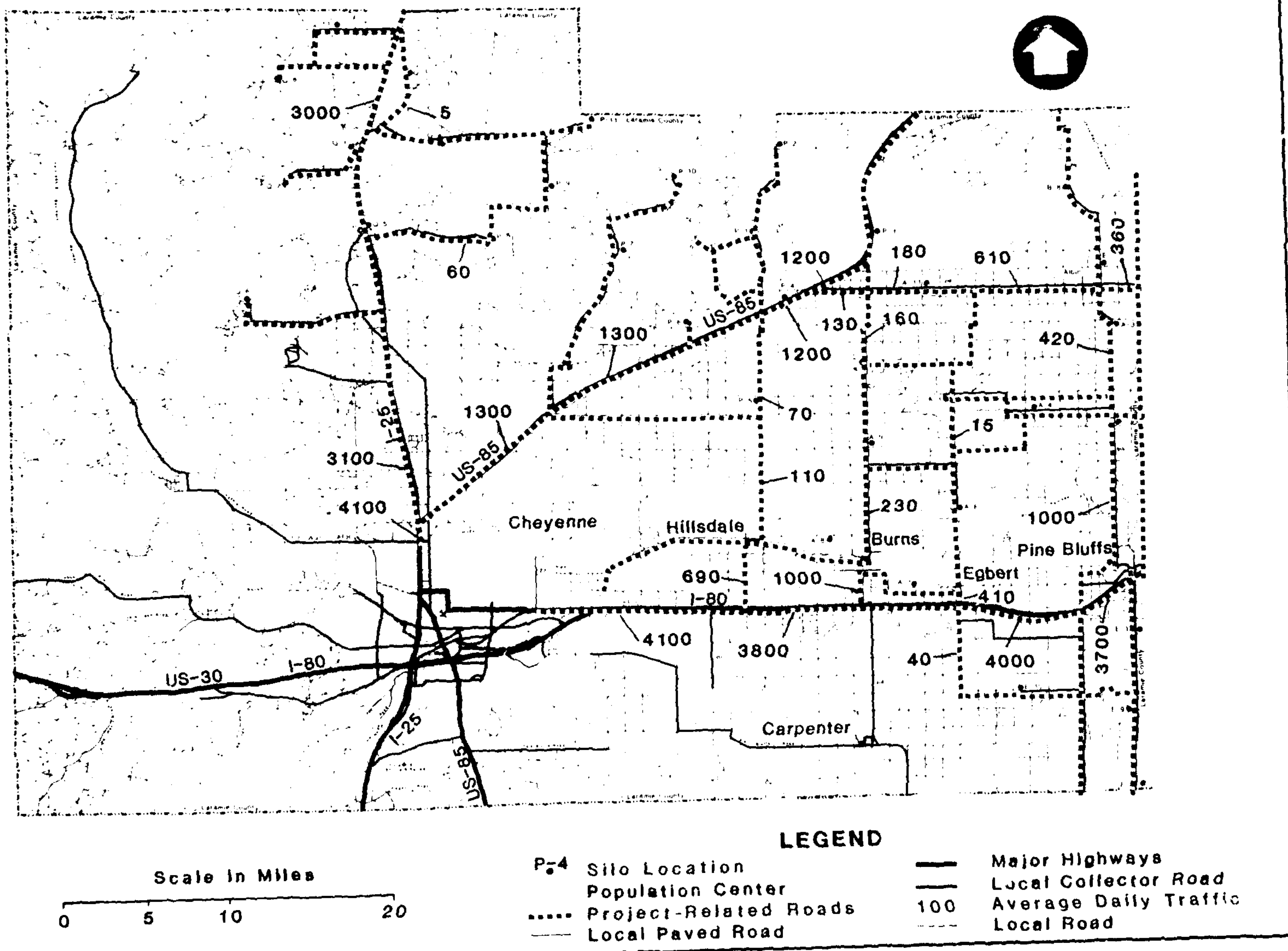


FIGURE 2.6-1-31 LARAMIE COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC COUNTS

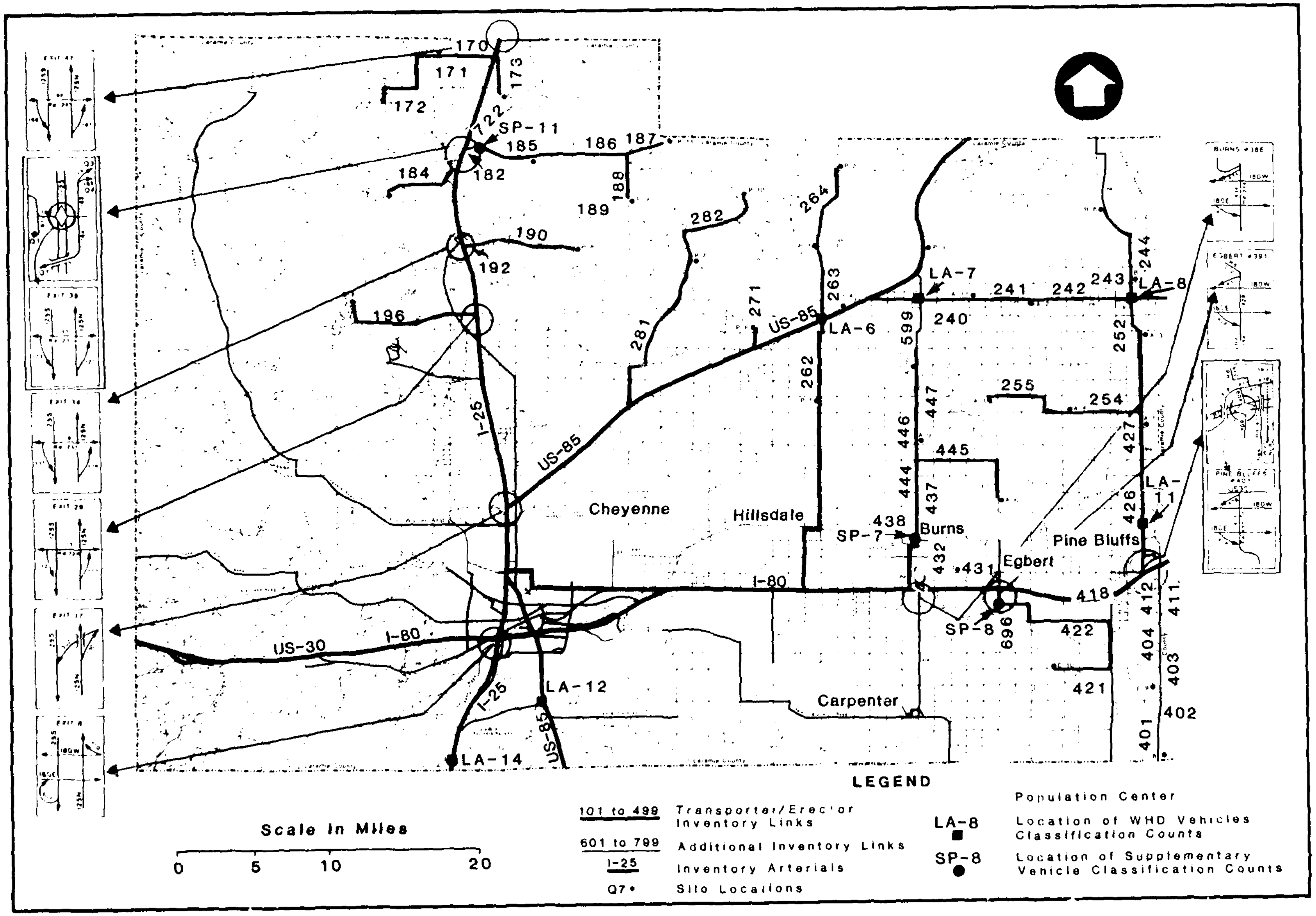


FIGURE 2.6.1-32 LARAMIE COUNTY TRANSPORTER/ERECTOR ROUTES

Table 2.6.1-11

LARAMIE COUNTY-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	15.25
D	Soil Surface Roads	76.81
E1	Gravel or Stoned Roads Not Graded and Drained	0.00
E2	Gravel or Stoned Roads Graded and Drained	10.22
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	1.50
G2	High-Type Mixed Bituminous Roads	142.07
H1	Low-Type Bituminous Penetration Roads	40.10
H2	High-Type Bituminous Penetration Roads	15.05
I	Bituminous Concrete	1.14
J	Portland Cement Concrete Roads	114.67
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD FOR LARAMIE COUNTY	416.81[a]

Other Elements: Description	Total Number	Structures: Description	Total Number
Substandard Curves[1]	16	Bridges	117
Buried Pipeline	9	Box Culverts	24
Overhead Cable	141	Reinforced Concrete Pipe	226
Buried Cable	8	Corrugated Metal Pipe	498
Silo Entrance Road	36	Metal Pipe Arches	17
Railroad Track	4	R.C. Arch Culverts	17
Overhead Sign	18	Cattle Guards	66

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

a This figure includes mileage recorded on both sides (directions) of the Interstate System.

Vehicle classification data were obtained from WHD for interstate, state, and some county roads within Laramie County. Additional vehicle classification counts were made on County roads during a weekday in November 1983. The locations of these counting stations are shown in Figure 2.6.1-32 and vehicle classification data for the County are presented in Table 2.6.1-12.

2.6.1.2.2 Platte County, Wyoming

Interstate 25 forms the north-south axis of the transportation system in Platte County and provides access to Wheatland and Chugwater, as shown in Figure 2.6.1-1, Regional Highways. U.S. 26 (Federal-Aid Primary) junctions with Interstate 25 north of Wheatland and provides east-west connection with Guernsey and eastern access to the population centers along the North Platte River. State highways (mostly Federal-Aid Secondaries) branch off these facilities to provide access to the other quadrants of the county. This hierarchy is also reflected in the functional role of these roadways as shown in Figure 2.6.1-33, Platte County-National Highway Functional Classification. Key county roads (high-type, paved) augment the state highways to form collector routes which connect with the low-type paved and gravel county roads to provide access throughout the county.

Portions of the roadway network generally used for the Minuteman program and 1983 total traffic volumes are shown in Figure 2.6.1-34, Platte County - Project-Related Roads.

Figure 2.6.1-35 shows T/E routes in Platte County and the numbering system that was developed to identify the T/E routes for the road inventory survey. Table 2.6.1-13 presents a summary of existing physical conditions of these T/E routes. This summary includes surface type and structural classification as well as information on associated roadway elements.

The major T/E route in Platte County is Interstate 25 from the border of Laramie County as far as U.S.-26 (44 miles). This is augmented by State Route 316 to the east of Wheatland (12 miles), State Route 314 (8 miles), State Route 313 from Chugwater to the border of Goshen County (9 miles), State Route 211 to the west of Chugwater (2 miles), State Route 320 to the north of Wheatland (3 miles), and 60 miles of county roads in the vicinities of Chugwater and Wheatland.

Vehicle classification data were obtained from WHD for interstate, state, and some county roads within Platte County. Additional vehicle classifications counts were made on County roads during a weekday in November 1983. The locations of these counting stations are shown in Figure 2.6.1-35 and vehicle classification data for the County are presented in Table 2.6.1-14.

2.6.1.2.3 Goshen County, Wyoming

Principal travel demands in Goshen County are oriented east-west among the population centers, including Torrington, located along the North Platte River axis served by U.S. 26 (Federal-Aid Primary). As shown in Figure 2.6.1-1, Regional Highways, north-south travel is accommodated primarily by U.S. 85 (Federal-Aid Primary) which bisects the county. Several state highways (high-type, paved) serve the towns south of Torrington, and two state roads (low-type, paved) cross the southern end of the county. The roles of these roads

Table 2.6.1-12

1983 VEHICLE CLASSIFICATION DATA-LARAMIE COUNTY

Station	Location	Number of Trucks and Buses: Peak Hours	Daily Traffic	Percentage of Total Vehicles	ADT Total Vehicles
LA6	U.S. 85 EAST	N/A	201	17.1%	1173
LA6	U.S. 85 WEST	N/A	201	17.2%	1166
LA6	Link 262	N/A	8	22.9%	35
LA7	Link 665 (North)	N/A	22	28.9%	76
LA7	Link 665 (South)	N/A	22	19.6%	112
LA7	Link 240 (East)	N/A	31	17.7%	175
LA7	Link 240 (West)	N/A	22	17.5%	126
LA8	Link 243	N/A	30	16.8%	179
LA8	Link 252	N/A	47	17.3%	272
LA8	Link 242	N/A	69	13.7%	502
LA8	Link 251	N/A	34	14.7%	232
LA11	Link 426 (North)	N/A	72	18.8%	382
LA11	Link 426 (South)	N/A	75	18.2%	413
LA11	WEST	N/A	4	7.8%	51
LA12	U.S. 85 (North)	N/A	315	16.9%	1863
LA12	U.S. 85 (South)	N/A	299	21.7%	1379
LA12	WEST	N/A	40	7.1%	566

Table 2.6.1-12 Continued
1983 VEHICLE CLASSIFICATION DATA-LARAMIE COUNTY

Station	Location	Peak Hours	Number of Trucks and Buses: Daily Traffic	Number of Trucks and Buses: Percentage of Total Vehicles	ADT Total Vehicles
LA 14	I25	N/A	1310	20.2%	6498
SP-7	Link 437	11	85	27.0%	315
SP-8	Link 422	1	5	8.3%	60
	Link 696	1	4	4.9%	81
SP-11	Link 722	0	0	-	24
SP-11	Link 182	3	5	19.2%	26
SP-11	Link 185	3	5	14.7%	34

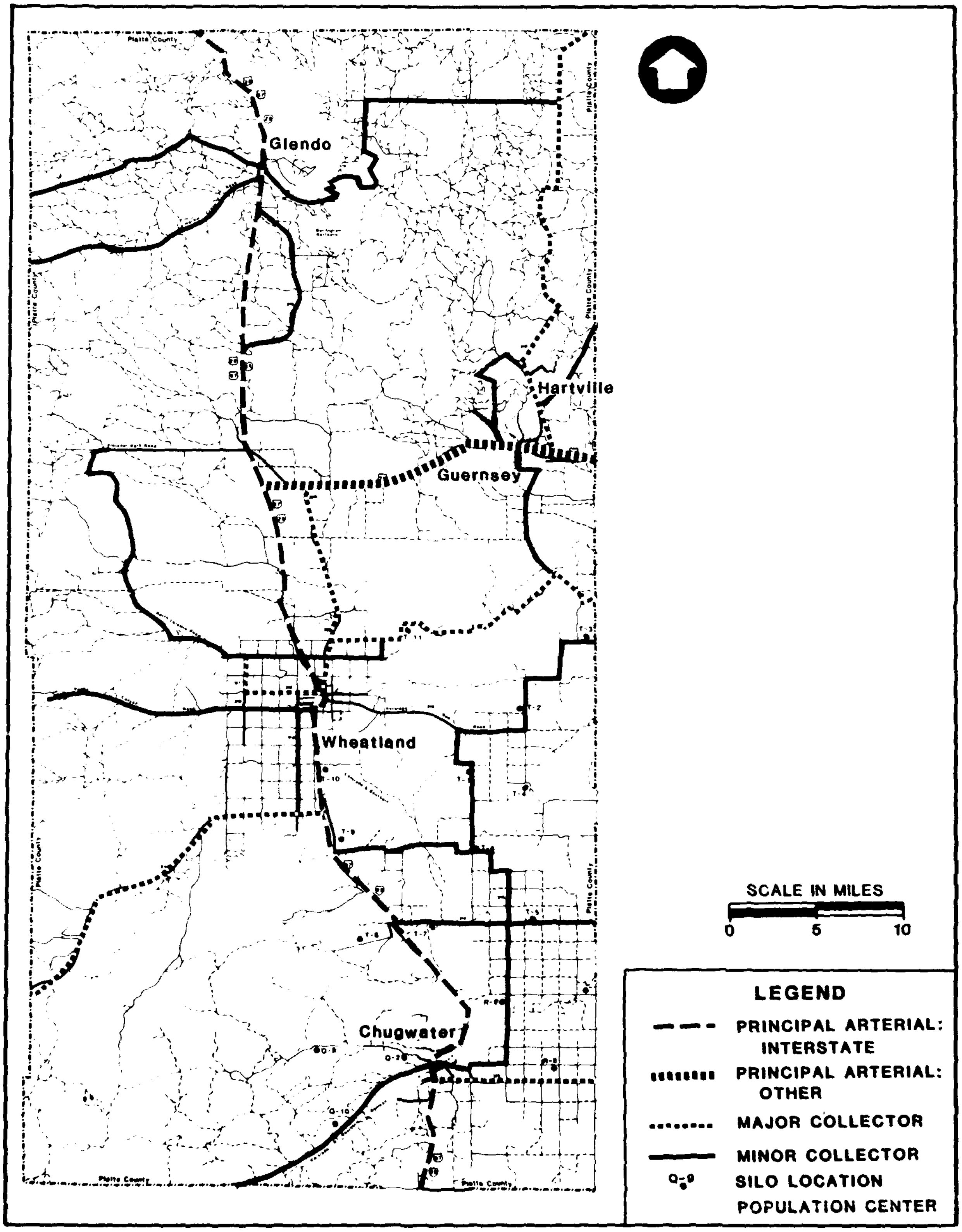


FIGURE 2.6.1-33 PLATTE COUNTY - NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

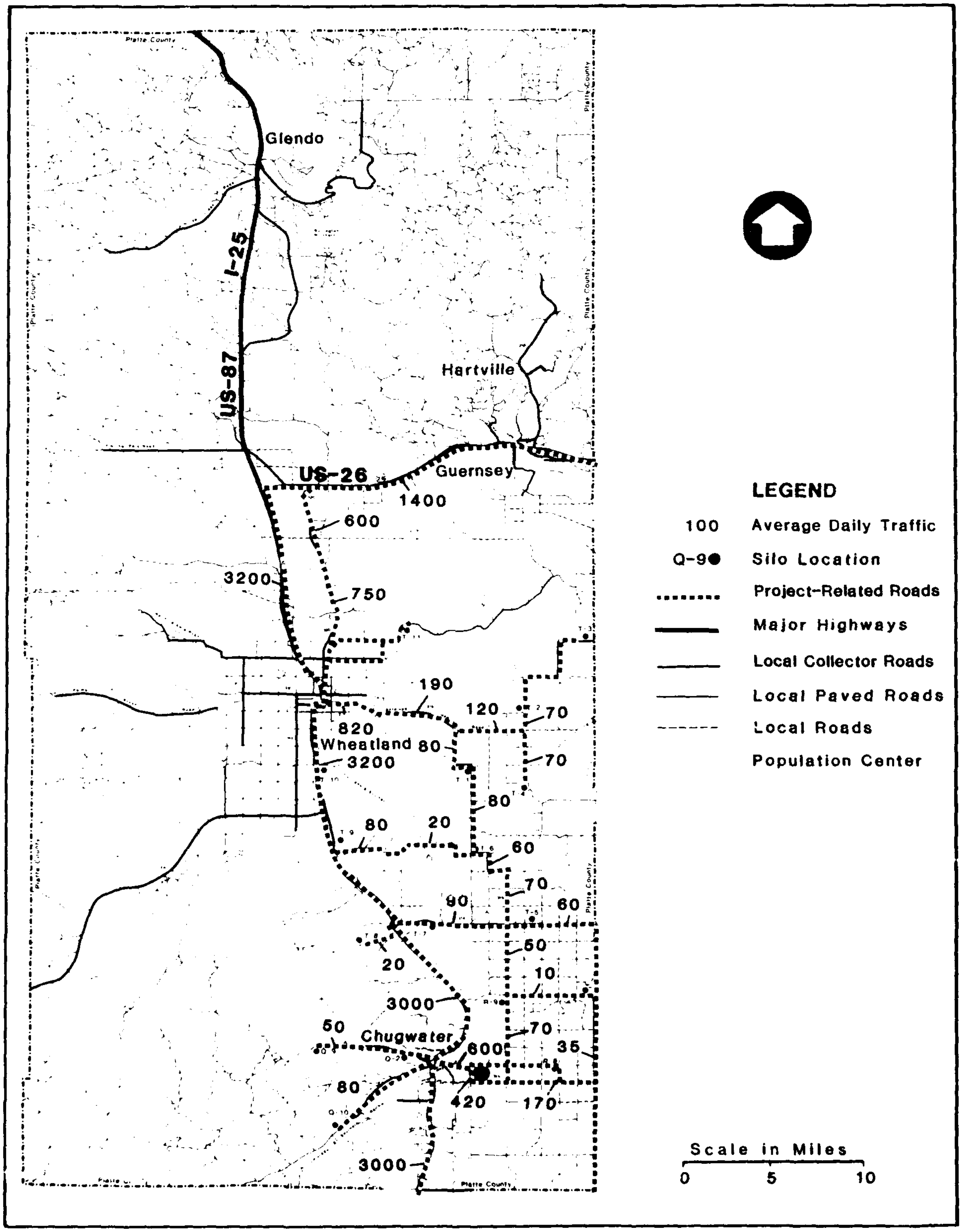


FIGURE 2.6.1-34 PLATTE COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC VOLUMES

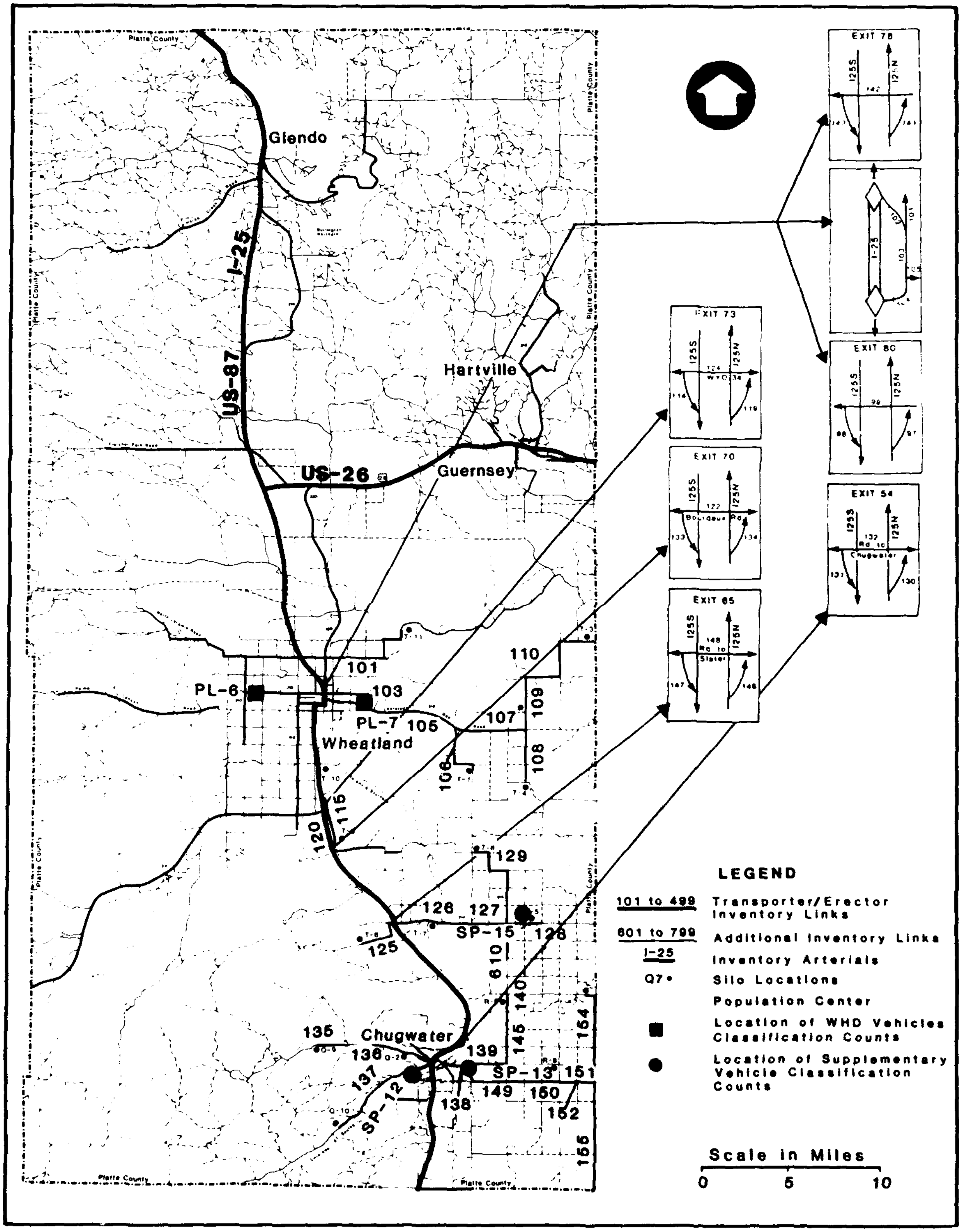


FIGURE 2.6.1-35 PLATTE COUNTY TRANSPORTER/ERECTOR ROUTES

Table 2.6.1-13

PLATTE COUNTY-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	6.21
D	Soil Surface Roads	6.00
E1	Gravel or Stoned Roads Not Graded and Drained	0.00
E2	Gravel or Stoned Roads Graded and Drained	20.51
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	0.00
G2	High-Type Mixed Bituminous Roads	124.55
H1	Low-Type Bituminous Penetration Roads	0.00
H2	High-Type Bituminous Penetration Roads	0.00
I	Bituminous Concrete	0.00
J	Portland Cement Concrete Roads	12.33
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD FOR PLATTE COUNTY	169.60[a]

Other Elements		Structures	
Description	Total Number	Description	Total Number
Substandard Curves[1]	26	Bridges	40
Buried Pipeline	21	Box Culverts	14
Overhead Cable	98	Reinforced Concrete Pipe	125
Buried Cable	13	Corrugated Metal Pipe	226
Silo Entrance Road	18	Metal Pipe Arches	9
Railroad Track	6	R.C. Arch Culverts	5
Overhead Sign	2	Cattle Guards	17

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

a This figure includes mileage recorded on both sides (directions) of the Interstate System.

Table 2.6.1-14

1983 VEHICLE CLASSIFICATION DATA-PLATTE COUNTY

Station	Location	Number of Trucks and Buses Peak Hours	Daily Traffic	Percentage of Total Vehicles	ADT Total Vehicles
PL-6	North	N/A	66	24.6%	268
PL-6	South	N/A	41	21.1%	194
PL-6	East	N/A	93	19.1%	487
PL-6	West	N/A	25	9.7%	259
PL-7	Link 105	N/A	185	16 %	1153
SP-12	Link 137	1	5	10.4%	48
SP-13	Link 138 (West)	6	48	36.9%	130
SP-13	Link 139 (East)	3	18	32.1%	56
SP-13	Link 149 (Southeast)	3	27	22.7%	119
SP-15	Link 129 (North)	3	18	75 %	24
SP-15	Link 610 (South)	3	11	55 %	20
SP-15	Link 127 (West)	5	37	78.7%	47
SP-15	Link 128 (East)	6	33	80.5%	41

are depicted in Figure 2.6.1-36, Goshen County-National Highway Functional Classification.

The U.S. numbered routes perform arterial roles, while the state highways and key county roads comprise the collector routes. The remaining county roads, low-type paved or gravel, make up the local roadway network providing access throughout the county. Figure 2.6.1-37, Goshen County Project-Related Roads shows the portions of the road system generally used and 1983 total traffic volumes on those segments.

Figure 2.6.1-38 shows T/E routes in Goshen County and the numbering system that was developed to identify the T/E routes for the road inventory survey. Table 2.6.1-15 presents a summary of existing physical conditions on these T/E routes. This summary includes surface type and structural classification as well as information on associated roadway elements.

The major T/E route in Goshen County is U.S. Route 85 from the border of Laramie County to milepost 89 just south of Torrington (33 miles). Additional T/E routes include State Route 152 from U.S. 85 to Yoder (2 miles), State Route 154 west from Yoder (4 miles), State Route 161 from U.S. 85 to State Road 92 (7 miles), State Route 92 between the junctions of State Routes 161 and 158 (3 miles), State Route 158 south from the junction with State Route 92 (4 miles), State Route 313 east from U.S. 85 to the border with Banner County, Nebraska (19 miles), and 40 miles of county roads in the region to the south of Torrington.

Vehicle classification data were obtained from the WHD for interstate, state, and some county roads within Goshen County. Additional vehicle classification counts were made on County roads during a weekday in November 1983. The locations of these counting stations are shown in Figure 2.6.1-38 and vehicle classification data for the County are presented in Table 2.6.1-16.

2.6.1.2.4 Kimball County, Nebraska

Interstate 80 traverses Kimball County forming the east-west axis of travel in the region as well as the county (Figure 2.6.1-1). Old U.S. 30 parallels Interstate 80 providing access to the city of Kimball and the village of Bushnell. Access to these communities is also provided by connections with Interstate Business Loop 80. State Highway 71 (Federal-Aid Primary) bisects the county serving north-south travel and providing access to the city of Kimball. State Route 71 is a high-type, paved road except for a section in the northern part of the county. These facilities function as arterials, while key county roads act as collectors, as shown in Figure 2.6.1-39, Kimball County - National Highway Functional Classification. The remaining county roads are low-type paved or gravel and provide local access.

The roads generally used and the 1983 total traffic volumes on these segments are shown in Figure 2.6.1-40, Kimball County - Project-Related Roads.

Project-related roadways consist of T/E routes, and roads functionally classified as collectors or higher.

Figure 2.6.1-41 shows T/E routes in Kimball County and the numbering system that was developed to identify the T/E routes for the road inventory survey.

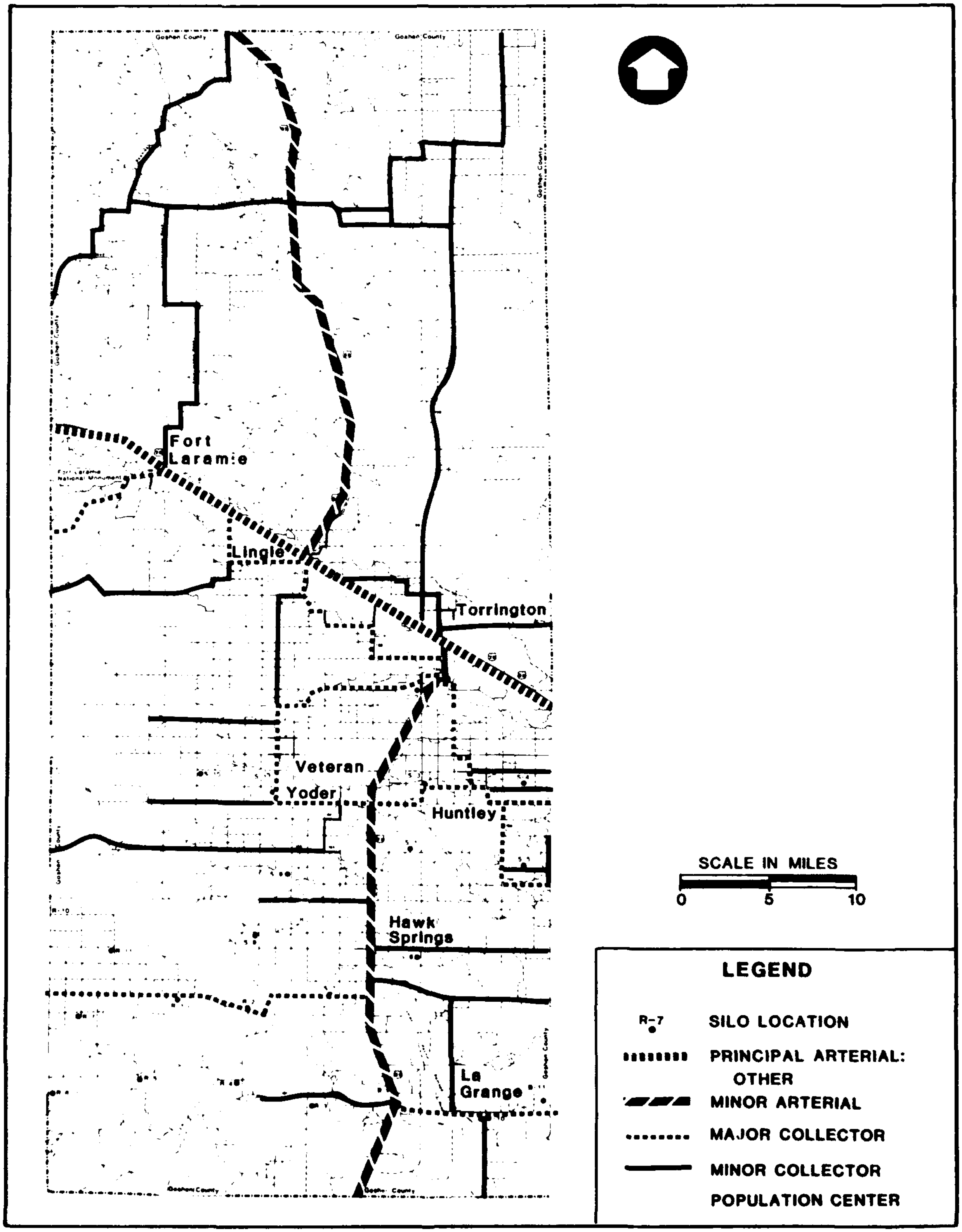


FIGURE 2.6.1-36 GOSHEN COUNTY - NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

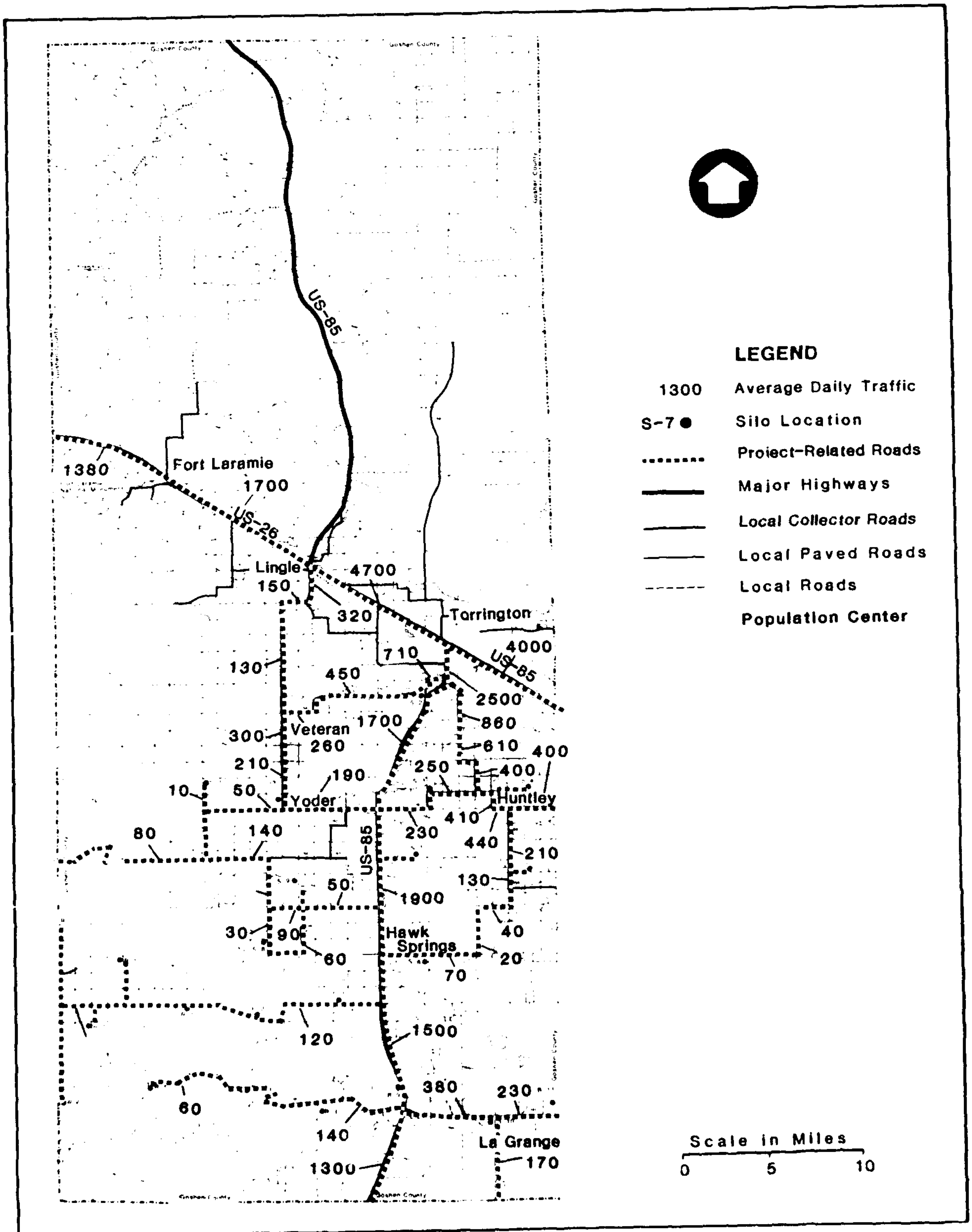


FIGURE 2.6.1-37 GOSHEN COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC VOLUMES

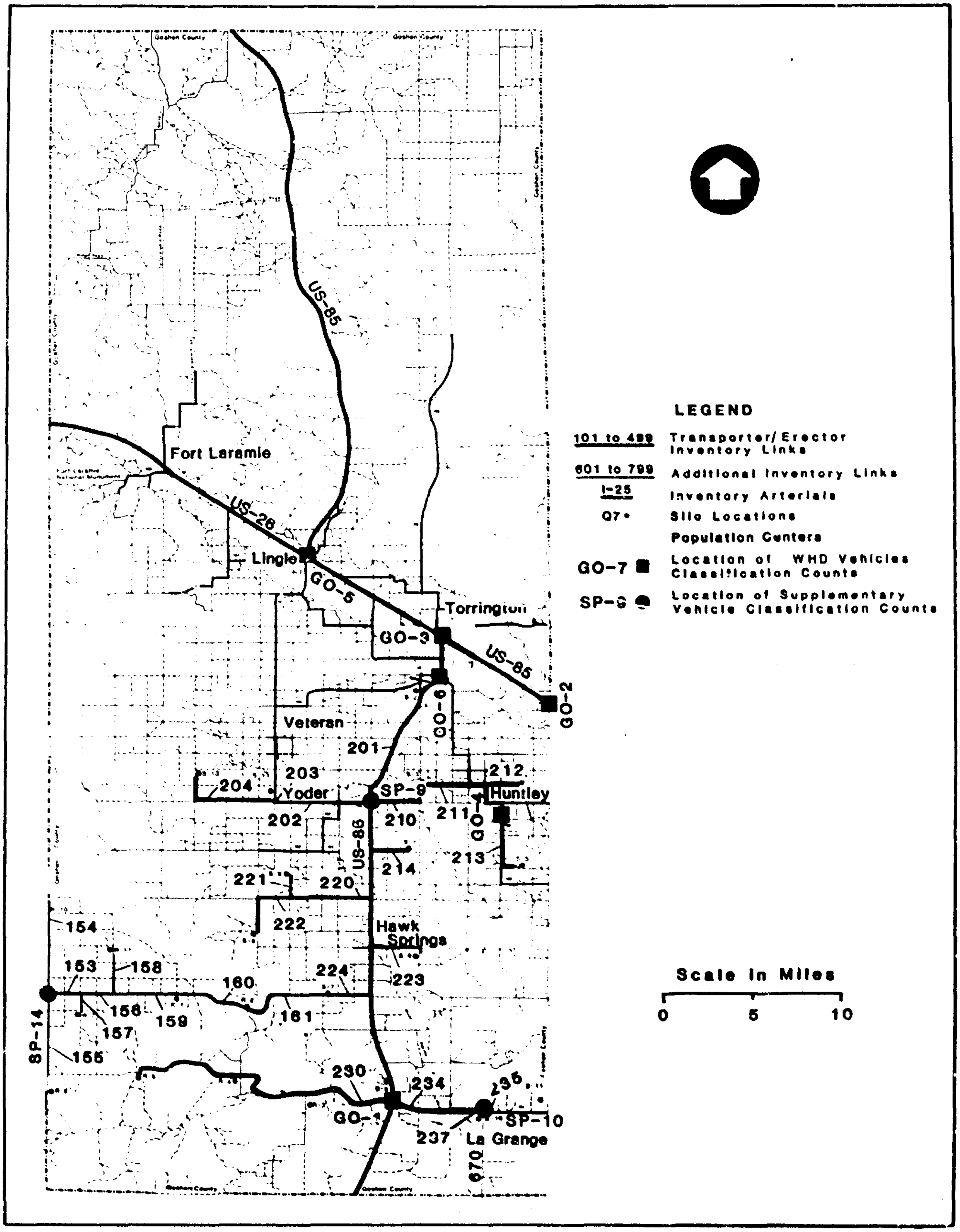


FIGURE 2.6.1-38 GOSHEN COUNTY TRANSPORTER/ERECTOR ROUTES

Table 2 5.1-15

GOSHEN COUNTY-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	16.65
D	Soil Surface Roads	15.69
E1	Gravel or Stoned Roads Not Graded and Drained	0.00
E2	Gravel or Stoned Roads Graded and Drained	12.18
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	2.62
G2	High-Type Mixed Bituminous Roads	91.85
H1	Low-Type Bituminous Penetration Roads	0.00
H2	High-Type Bituminous Penetration Roads	0.00
I	Bituminous Concrete	0.00
J	Portland Cement Concrete Roads	0.00
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD FOR GOSHEN COUNTY	138.99

Other Elements		Structures	
Description	Total Number	Description	Total Number
Substandard Curves[1]	18	Bridges	12
Buried Pipeline	3	Box Culverts	15
Overhead Cable	43	Reinforced Concrete Pipe	57
Buried Cable	0	Corrugated Metal Pipe	157
Silo Entrance Road	21	Metal Pipe Arches	12
Railroad Track	9	R.C. Arch Culverts	0
Overhead Sign	2	Cattle Guards	15

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

Table 2.6.1-16

1983 VEHICLE CLASSIFICATION DATA-GOSHEN COUNTY

		Number of Trucks and Buses			
Station	Location	Peak Hours	Daily Traffic	Percentage of Total Vehicles	ADT Total Vehicles
GO-1	U.S. 85 (North)	N/A	209	19.1%	1096
GO-1	U.S. 85 (South)	N/A	212	19.4%	1096
GO-1	Link 230 (West)	N/A	8	9 %	89
GO-1	Link 234 (East)	N/A	62	20 %	310
GO-2	U.S. 26	N/A	830	16.9%	4923
GO-3	U.S. 26 EAST	N/A	520	9.3%	5562
GO-3	U.S. 26 WEST	N/A	520	9.3%	5562
GO-4	Link 632	N/A	73	17.2%	424
GO-4	Link 213 (West)	N/A	89	19.8%	449
GO-4	Link 213 (South)	N/A	23	14.1%	163
GO-5	Link 622 South	N/A	532	14.7%	3621
GO-5	U.S. 26 WEST	N/A	341	15.5%	2202
GO-6	Link 629	N/A	191	23.2%	823
GO-6	Link 631	N/A	397	15 %	2645
SP-9	Link 201	30	200	22.9%	875
SP-9	Link 202	14	107	14.6%	731
SP-9	Link 210	9	52	14.9%	350

Table 2.6.1-16 (Continued)
1983 VEHICLE CLASSIFICATION DATA-GOSHEN COUNTY

Station	Location	Number of Trucks and Buses			ADT
		Peak Hours	Daily Traffic	Percentage of Total Vehicles	Total Vehicles
SP-10	Link 237	10	128	41.8%	306
SP-10	Link 235	9	102	42.1%	242
SP-10	Link 670	4	58	44.3%	131
SP-14	Link 154 (North)	0	0	-	23
SP-14	Link 155 (South)	0	0	-	29
SP-14	Link 152 (West)	3	23	21.7%	106
SP-14	Link 153 (East)	3	23	22.5%	102

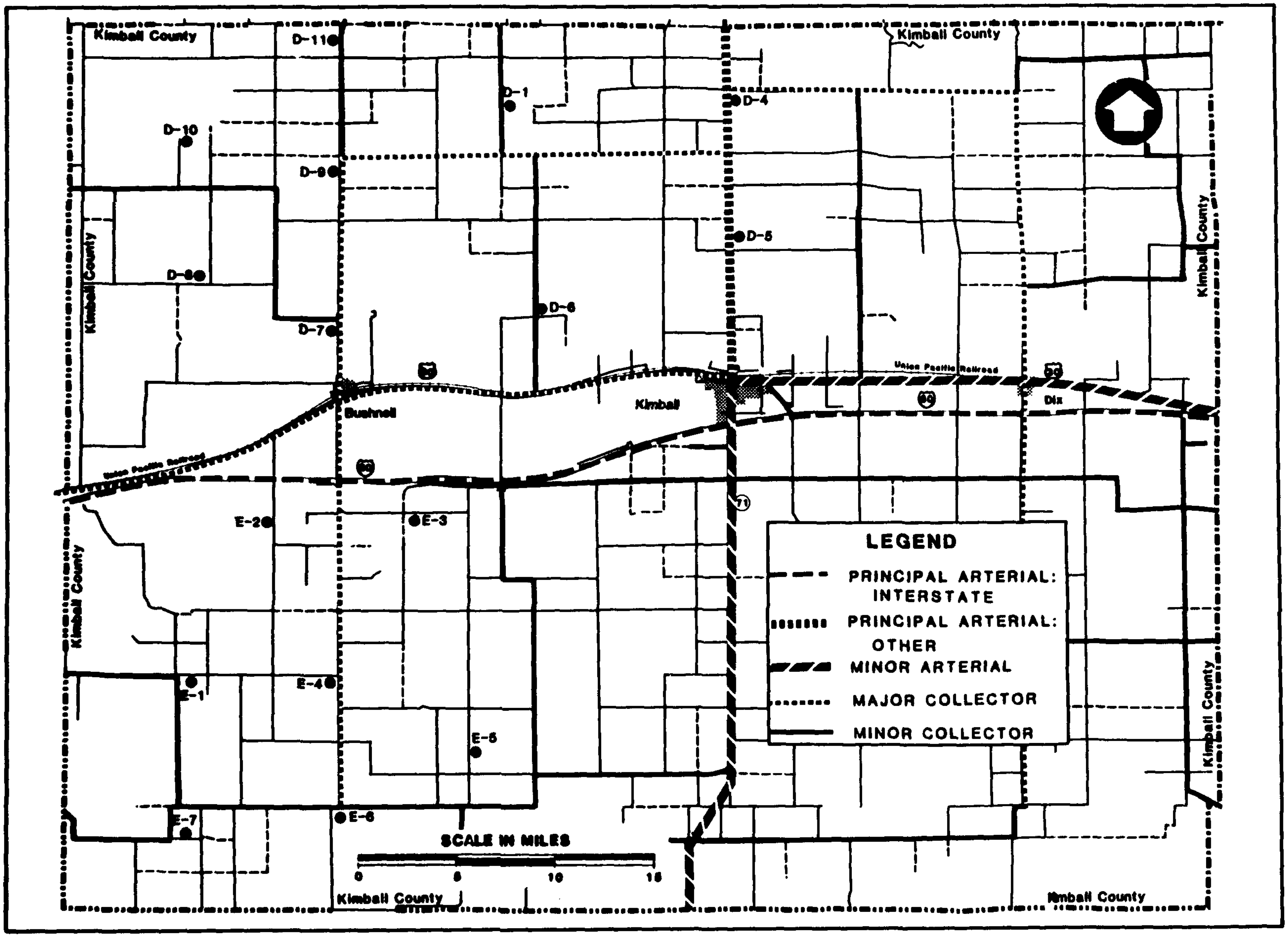


FIGURE 2.6.1-39 KIMBALL COUNTY - NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

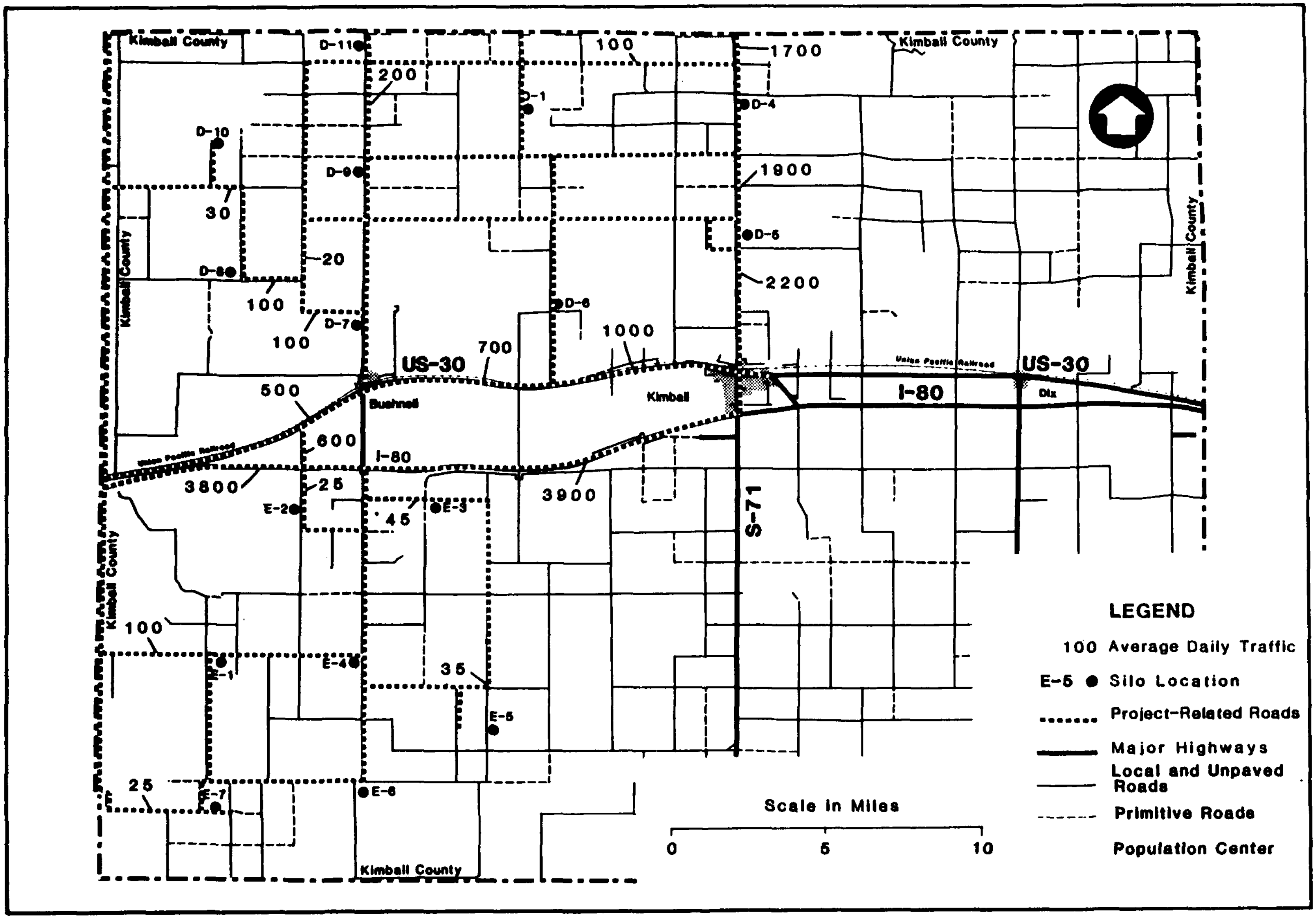


FIGURE 2.6.1-40 KIMBALL COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC VOLUMES

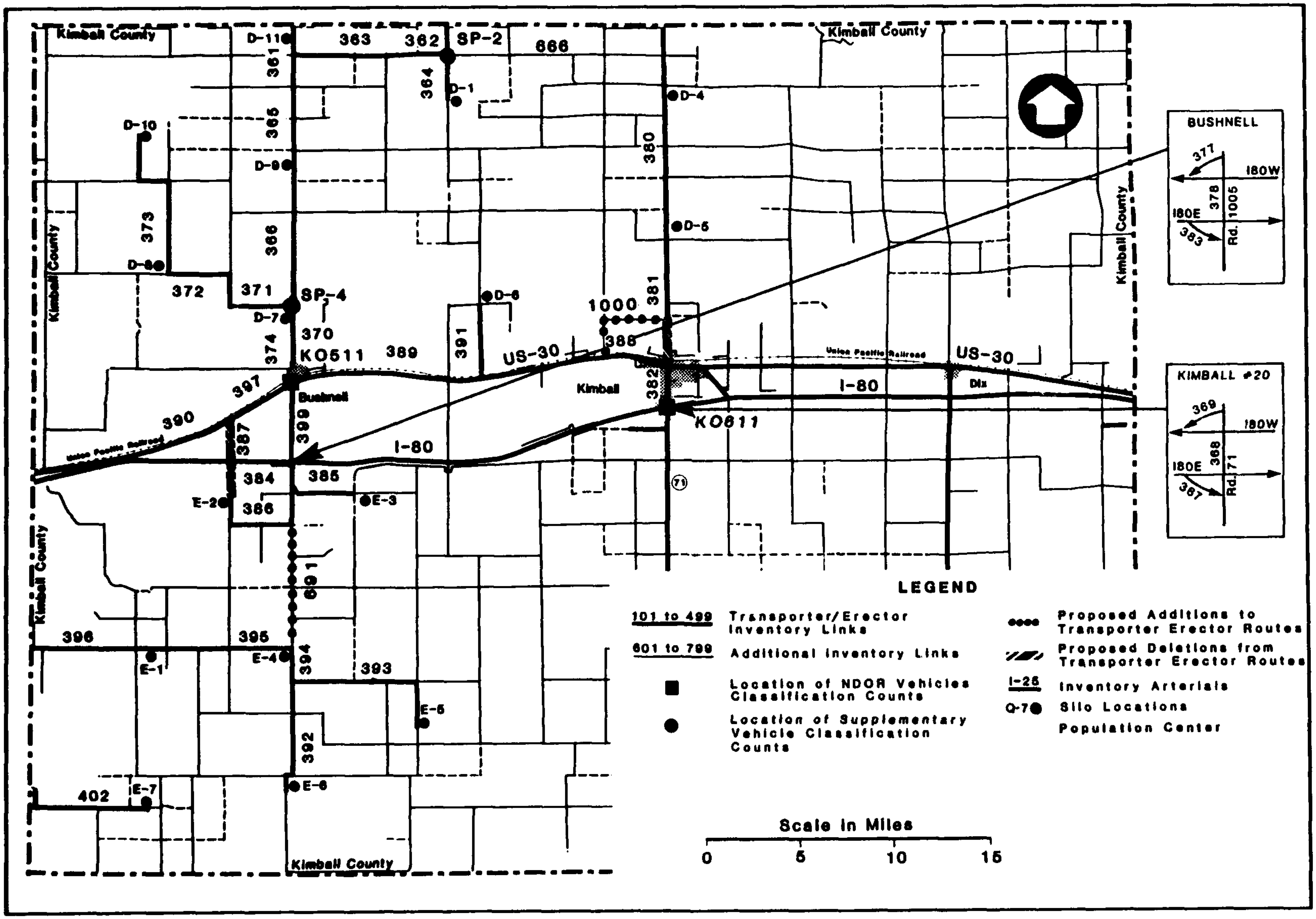


FIGURE 2.6.1-41 KIMBALL COUNTY - TRANSPORTER/ERECTOR VEHICLE ROUTES

Also shown are T/E route changes proposed by the NDOR. Table 2.6.1-17 presents a summary of existing physical conditions on these T/E routes. This summary includes surface type and structural classifications as well as information on associated roadway elements.

The major T/E routes in Kimball County comprise Interstate 80 from the border of Laramie County to the Kimball interchange (20 miles), Nebraska State Route 71 from its intersection from Interstate 80 at Kimball to the border of Banner County (12 miles), and U.S. 30 from the border of Laramie County to Kimball (20 miles). These are supplemented by 90 miles of county roads to the north and west of Kimball.

Vehicle classification data were obtained from NDOR for interstate, state, and some county roads within Kimball County. Additional vehicle classification counts were made on County roads during a weekday in November 1983. The locations of these counting stations are shown in Figure 2.6.1-41 and vehicle classification data for the County are presented in Table 2.6.1-18.

2.6.1.2.5 Banner County, Nebraska

This sparsely populated county has only two high-type, paved roads, State Highway 71 (Federal-Aid Primary) to the north of the Harrisburg junction and State Highway 88 (Federal-Aid Secondary) in the eastern portion of the county (Figure 2.6.1-1).

State Highway 71 acts as an arterial, while State Route 88 and key county roads (gravel) serve as collectors, as shown in Figure 2.6.1-42, Banner County - National Highway Functional Classification. Most of the remaining roads are gravel.

The roads generally used and the 1983 total traffic volumes on these segments are depicted in Figure 2.6.1-43, Banner County - Project-Related Roads. Figure 2.6.1-44 shows T/E routes in Banner County and the numbering that was developed to identify the T/E routes for the road inventory survey. Also shown are T/E route changes proposed by the NDOR. Table 2.6.1-19 presents a summary of existing physical conditions on these T/E routes. This summary includes surface type and structural classifications as well as information on associated roadway elements.

The major T/E routes in Banner County include State Route 71 from the border of Kimball County to a point 1 mile south of the border of Scotts Bluff County (20 miles) and State Route 88 east from its intersection with State Route 71 (8 miles). These are supplemented by 80 miles of county roads throughout the county.

Vehicle classification data were obtained from NDOR for interstate, state, and some county roads within Banner County. Additional vehicle classification counts were made on County roads during November 1983. The locations of these counting stations are shown in Figure 2.6.1-44 and vehicle classification data for the County are presented in Table 2.6.1-20.

Table 2.6.1-17

KIMBALL COUNTY-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	2.00
D	Soil Surface Roads	33.10
E1	Gravel or Stoned Roads Not Graded and Drained	3.70
E2	Gravel or Stoned Roads Graded and Drained	23.85
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	0.00
G2	High-Type Mixed Bituminous Roads	30.70
H1	Low-Type Bituminous Penetration Roads	0.00
H2	High-Type Bituminous Penetration Roads	6.54
I	Bituminous Concrete	0.00
J	Portland Cement Concrete Roads	42.71
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD FOR KIMBALL COUNTY	142.60[a]

Other Elements Description	Total Number	Structures Description	Total Number
Substandard Curves[1]	1	Bridges	32
Buried Pipeline	6	Box Culverts	87
Overhead Cable	45	Reinforced Concrete Pipe	118
Buried Cable	0	Corrugated Metal Pipe	84
Silo Entrance Road	17	Metal Pipe Arches	41
Railroad Track	3	R.C. Arch Culverts	1
Overhead Sign	1	Cattle Guards	1

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

a This figure includes mileage recorded on both sides (directions) of the Interstate System.

Table 2.6.1-18

VEHICLE CLASSIFICATION DATA - KIMBALL COUNTY

		No. of Trucks & Buses			
Station	Location	Peak Hour	Daily Traffic	Percentage of Total Vehicles	ADT Total Vehicles
KO 511	Link 389 U.S. 30 East	N/A	96	13.4%	714
KO 511	Link 397 U.S. 30 West	N/A	84	16.6%	505
KO 511	Link 399	N/A	30	15.9%	189
KO 511	Link 374	N/A	67	13.1%	511
KO 611	I-80 East	N/A	1,499	42.9%	3,498
KO 611	I-80 West	N/A	1,529	38.4%	3,978
KO 611	State Highway 7 (South)	N/A	370	25.9%	1,428
KO 611	Link 382 S.H. 71 (North)	N/A	730	24.9%	2,927
SP-2	Link 362	0	0	-	10
SP-2	Link 364	0	0	-	20
SP-2	Link 666	1	3	15.8%	19
SP-2	Link 363	1	3	33.3%	9
SP-4	Link 366	2	8	8%	99
SP-4	Link 370	1	8	5.3%	150
SP-4	Link 371	1	3	4.8%	63

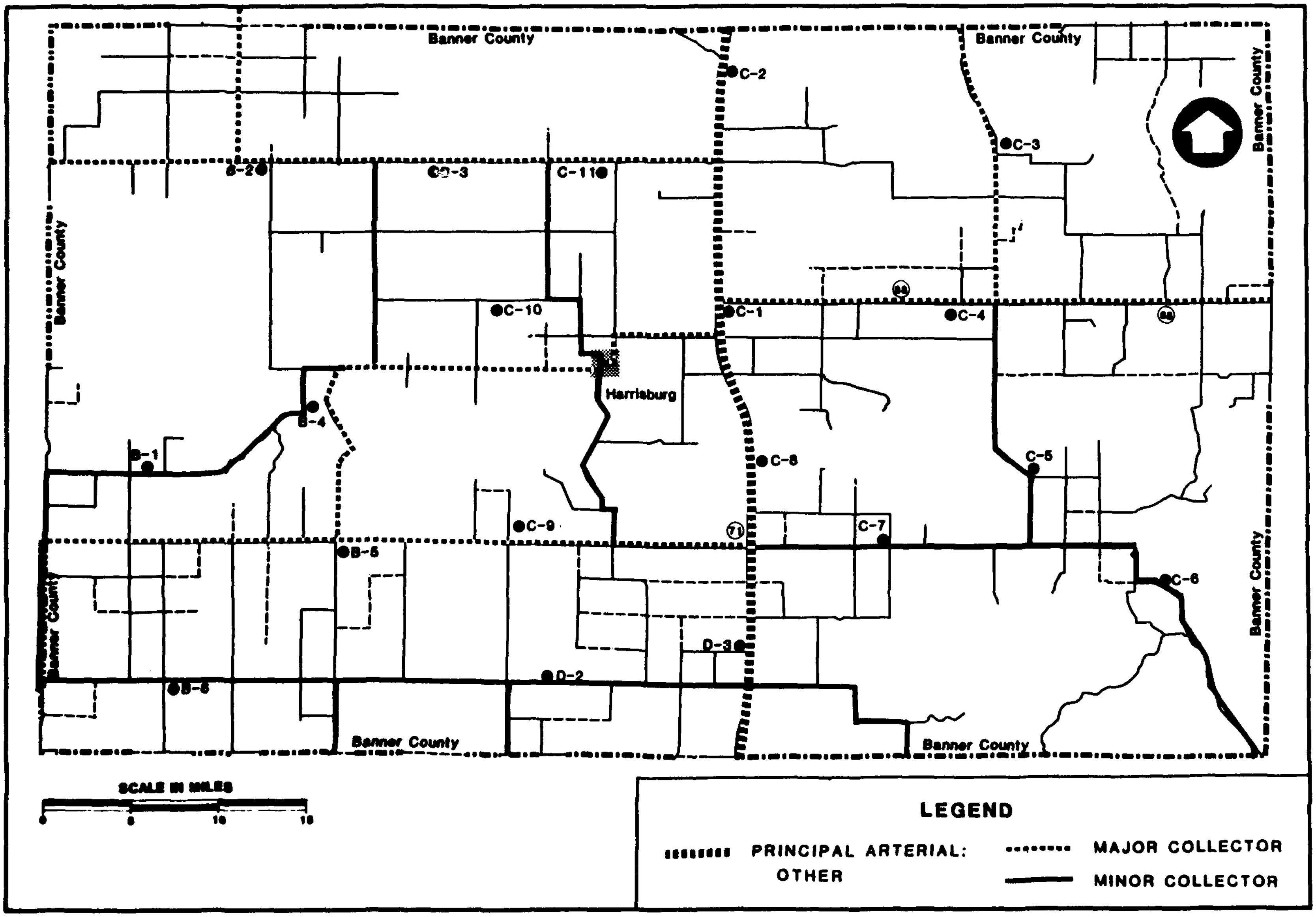


FIGURE 2.6.1-42 BANNER COUNTY - NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

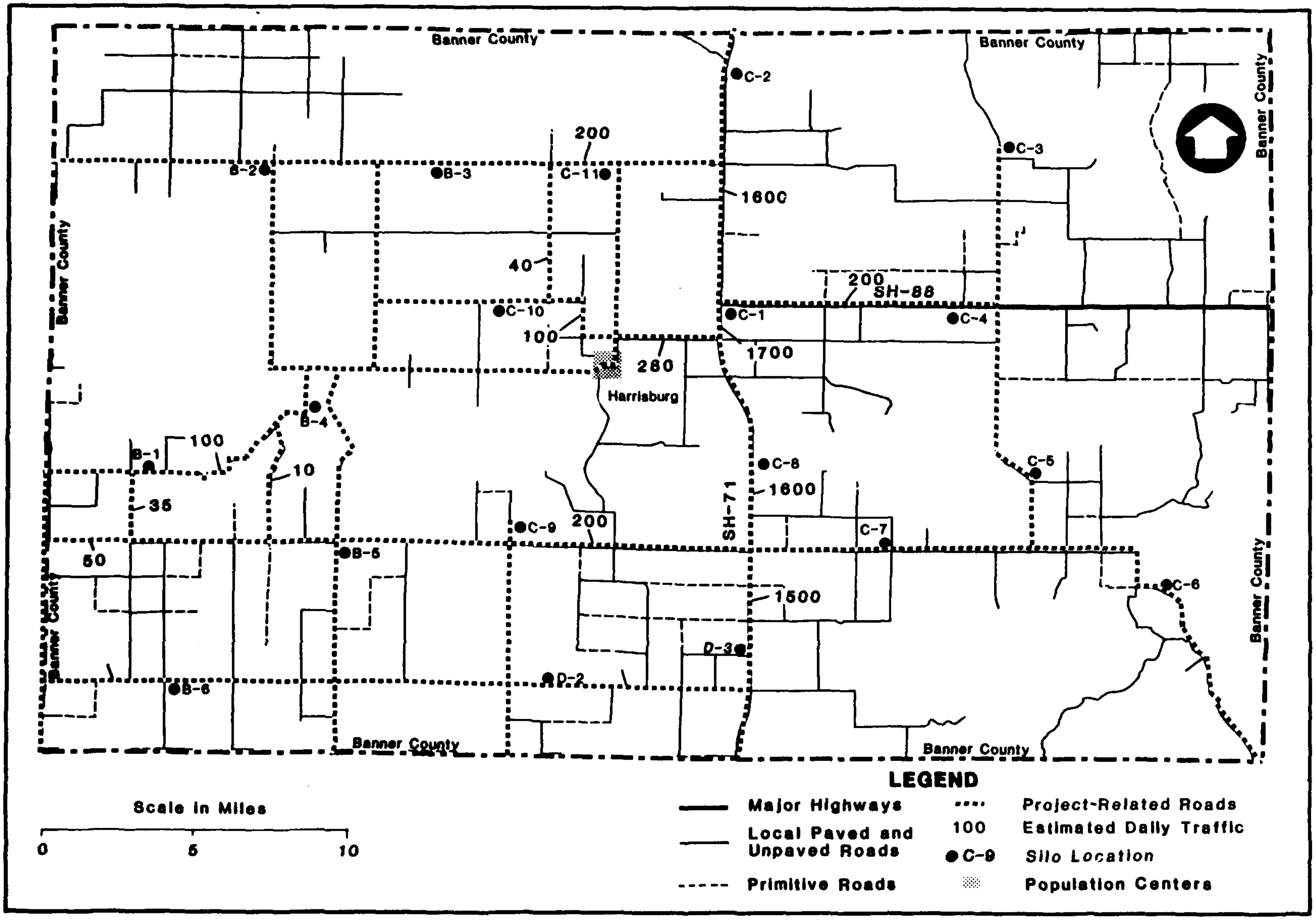


FIGURE 2.6.1-43 BANNER COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC VOLUMES

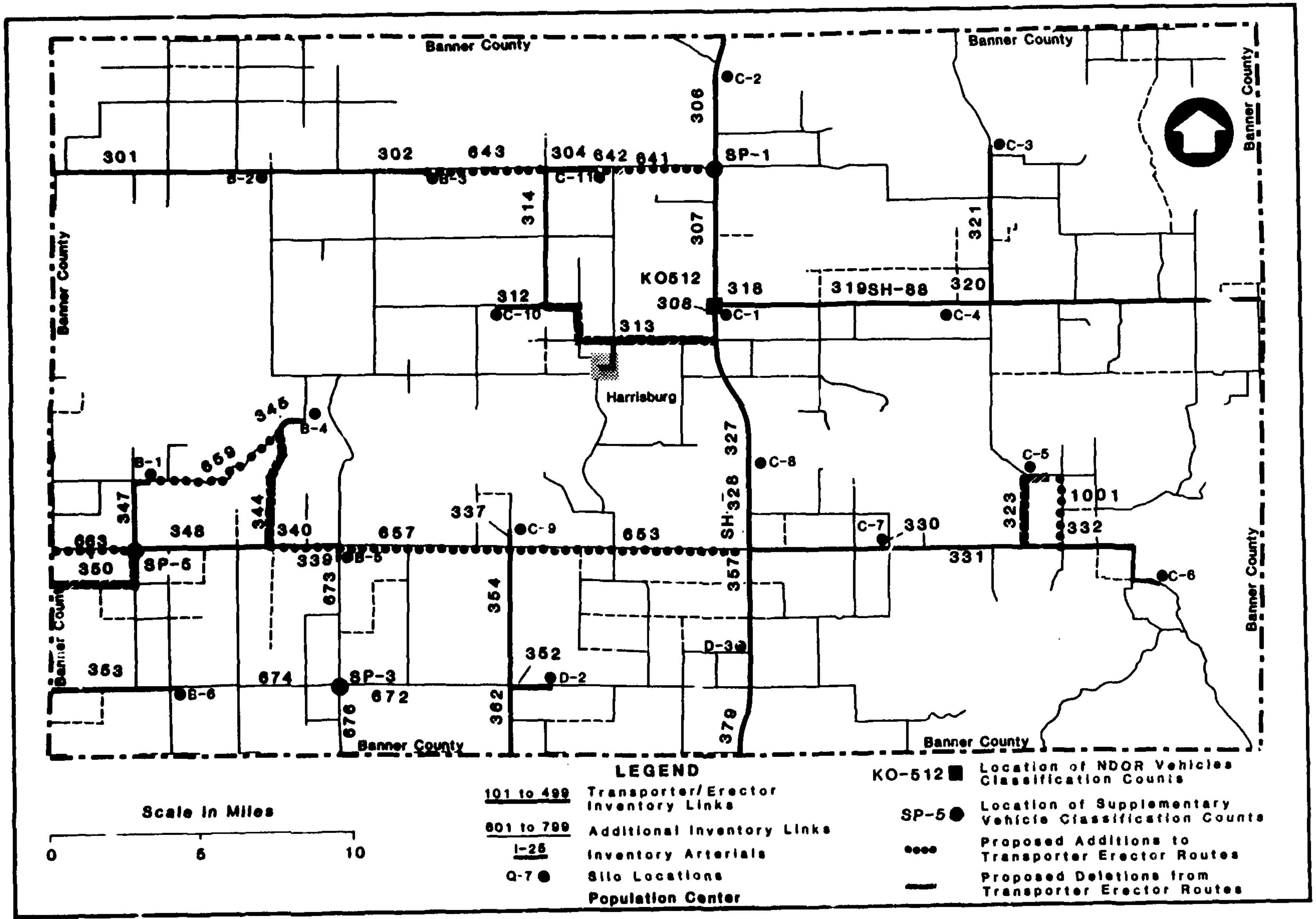


FIGURE 2.6.1-44 BANNER COUNTY TRANSPORTER/ERECTOR ROUTES

Table 2.6.1-19

BANNER COUNTY-T/E ROUTES
SUMMARY OF PHYSICAL CONDITIONS

Code	Description	Mileage
A	Primitive Roads	0.00
B	Unimproved Roads	0.00
C	Graded and Drained Earth Roads	1.99
D	Soil Surface Roads	25.75
E1	Gravel or Stoned Roads Not Graded and Drained	0.00
E2	Gravel or Stoned Roads Graded and Drained	36.92
F	Bituminous Surface Treated Roads	0.00
G1	Low-Type Mixed Bituminous Roads	0.00
G2	High-Type Mixed Bituminous Roads	37.24
H1	Low-Type Bituminous Penetration Roads	0.00
H2	High-Type Bituminous Penetration Roads	0.00
I	Bituminous Concrete	0.00
J	Portland Cement Concrete Roads	0.00
M	Combination Type Roads	0.00
	Other	0.00
	TOTAL MILES OF ROAD FOR BANNER COUNTY	101.90

Other Elements Description	Total Number	Structures Description	Total Number
Substandard Curves[1]	1	Bridges	23
Buried Pipeline	3	Box Culverts	17
Overhead Cable	30	Reinforced Concrete Pipe	0
Buried Cable	1	Corrugated Metal Pipe	112
Silo Entrance Road	19	Metal Pipe Arches	32
Railroad Track	0	R.C. Arch Culverts	0
Overhead Sign	0	Cattle Guards	6

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

Table 2.6.1-20

1983 VEHICLE CLASSIFICATION DATA - BANNER COUNTY

Station	Location	No. of Trucks & Buses Peak Hours	Daily Traffic	Percentage of Total Vehicles	ADT Total Vehicles
KO 512	S.H. 71 Link 307	N/A	315	20.5%	1,539
KO 512	S.H. 71 Link 308	N/A	330	19.7%	1,677
KO 512	Link 318	N/A	31	13.4%	232
SP-1	S.H. 71 Link 306	33	375	19.9%	1,888
SP-1	S.H. 71 Link 307	34	369	20.7%	1,780
SP-1	Link 641	3	15	11.6%	129
SP-1	East	2	7	13.5%	52
SP-3	Link 673	3	21	38.2%	55
SP-3	Link 676	3	13	20.6%	63
SP-3	Link 674	2	14	31.8%	44
SP-3	Link 672	3	22	46.8%	47
SP-5	Link 347	4	12	42.9%	28
SP-5	Link 350	2	3	23.1%	13
SP-5	Link 663	1	10	23.3%	43
SP-5	Link 348	3	6	22.2%	27

2.6.1.2.6 Scotts Bluff County, Nebraska

U.S. 26 (Federal-Aid Primary) cuts diagonally across the county, serving the City of Scottsbluff and other population centers along the North Platte River (Figure 2.6.1-1). State Highways 29 and 92 (Federal-Aid Primaries) parallel U.S. 26, providing access to the city of Gering and to areas south of the North Platte River. State Highway 71 (Federal-Aid Primary) accommodates north-south traffic to and through the Scottsbluff - Gering area. The above routes perform as arterials, while key county roads serve as collectors, as shown in Figure 2.6.1-45 (Scotts Bluff County - National Highway Functional Classification). A grid pattern of low-type paved and gravel roads serves the valley with a few routes providing access to hilly areas within the county.

Although there are no T/E routes in Scotts Bluff County, some Minuteman operational travel occurs on main roads that will be used for construction and operational activities during project deployment. These roads and their 1983 total traffic volumes are depicted in Figure 2.6.1-46.

There are no T/E routes in Scotts Bluff County and, hence, no inventory of physical conditions in this county has been made.

2.6.1.2.7 Fort Collins, Greeley, Denver Corridor

The additional population attraction of Fort Collins and Greeley residents to the project and the important transportation hub of Denver require that this corridor be considered for impact analysis.

This corridor is dominated by Interstate 25 between Denver and Cheyenne which forms the northern spoke of the transportation wheel extending from the hub of Denver. Interstate 25 is a multilane limited access highway. Six lanes run to the north of the Fort Collins-Greeley area and 4 lanes continue north to Cheyenne and on through Wyoming. Traffic volumes are low (20,000 - 30,000 ADT) between Denver and Fort Collins except for the metropolitan Denver area, where ADTs are approximately 75,000.

The only other major highway in the corridor is U.S. Route 85 which also runs from Denver to Cheyenne paralleling Interstate 25 to the east. It is a more direct connection from Greeley to both Denver and Cheyenne. U.S. 85 is a multi-lane undivided highway from Denver to north of Greeley and two lanes from there northerly. ADT on U.S. 85 is approximately 61,000 in the metropolitan Denver area, decreasing to 10,000 in the Greeley area and only 4,000 ADT between Greeley and Cheyenne.

The highway system forming the transportation corridor between Cheyenne and Denver is centered around Interstate 25 and its parallel routes, U.S. 85 and U.S. 287 (Federal-Aid Primaries). These routes provide access to Colorado population centers located along the corridor. Access to the sparsely populated northern third of the corridor is provided by State Highway 14 and a few gravel roads.

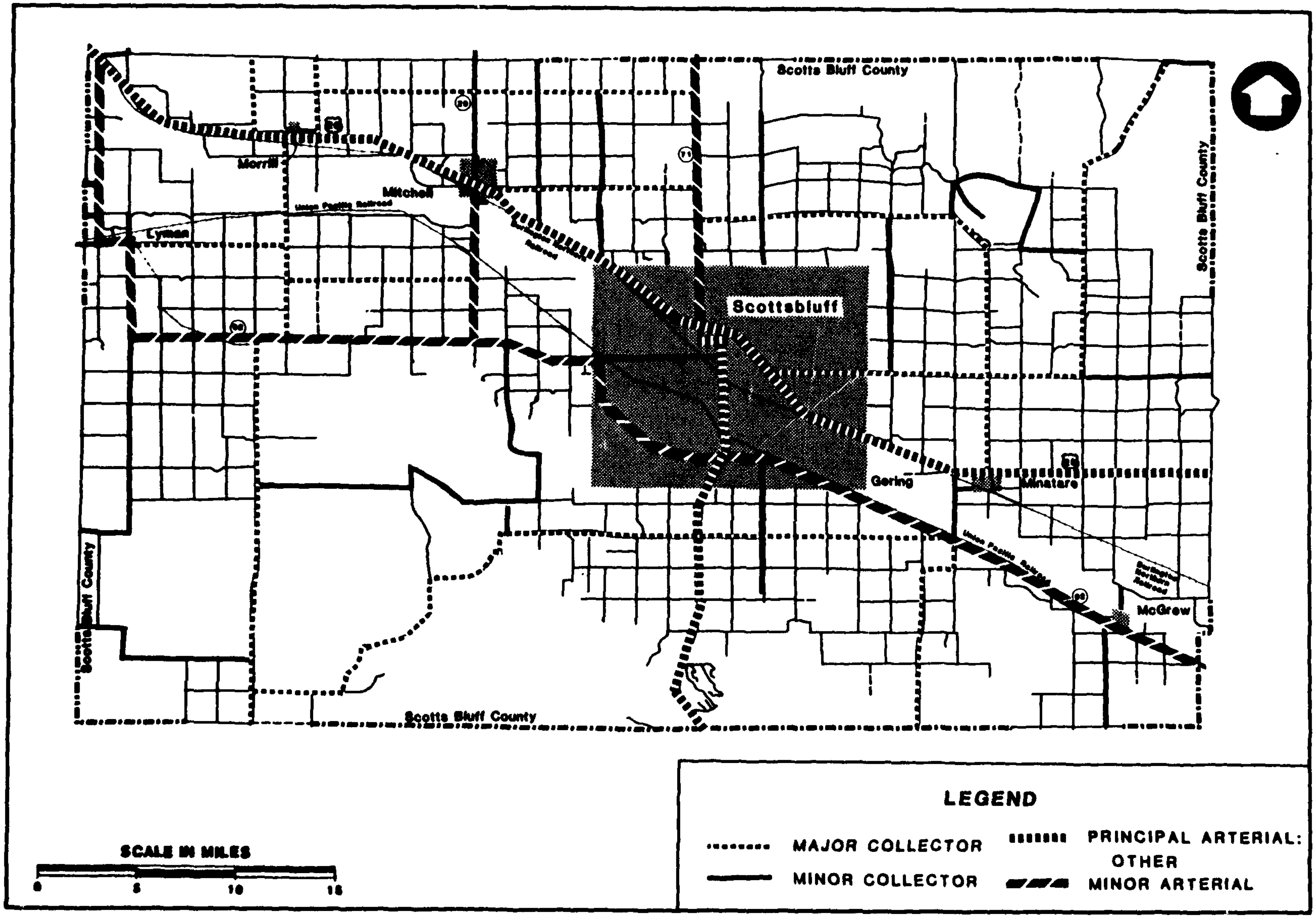


FIGURE 2.6.1-45 SCOTTS BLUFF COUNTY NATIONAL HIGHWAY FUNCTIONAL CLASSIFICATION

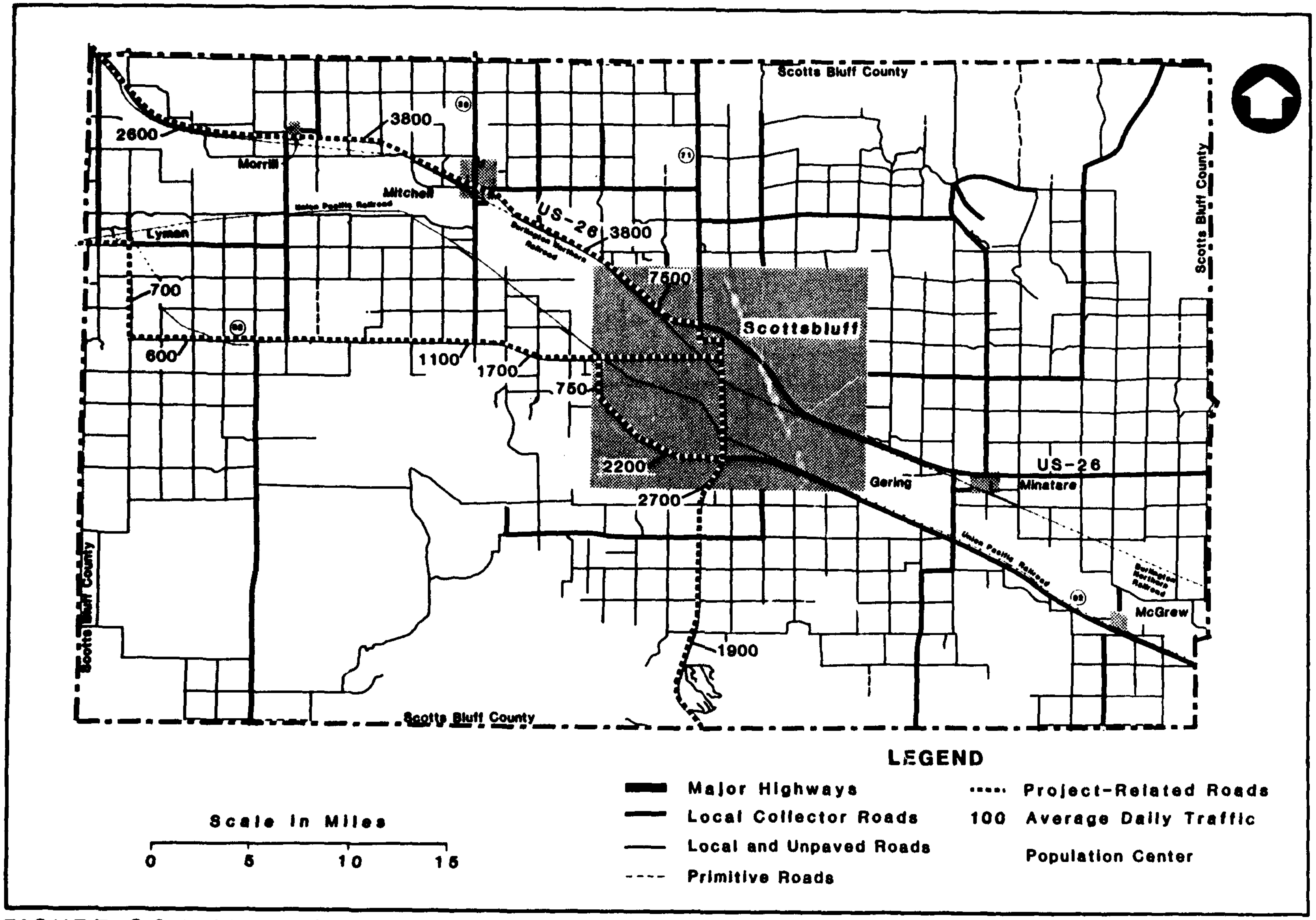


FIGURE 2.6.1-46 SCOTTS BLUFF COUNTY PROJECT-RELATED ROADS AND 1983 ESTIMATED TRAFFIC VOLUMES

2.6.2 Railroads

Two rail lines operate in the study area. The UP operates a major double track line extending from Council Bluffs, Iowa, to Salt Lake City, Utah, which is then single-tracked to the West Coast. This line carries over 30 million annual gross tons of freight and is also classified as a route required for defense. Other mainlines extend from this trunk line from Egbert, Wyoming, north to Torrington, Wyoming, from an area just south of Cheyenne further south to Greeley and Denver, Colorado, and from North Platte, Nebraska, parallel to the North Platte River to the Torrington, Wyoming, area. These lines carry approximately 10 million gross tons annually.

BN and its subsidiary, Colorado and Southern Railroad (C&S), operate a mainline from Cheyenne north through Wyoming, and an unclassed line south toward Denver. Both of these lines carry between 5 to 10 million annual gross tons of freight. The average traffic on the mainline is approximately two and one-half trains per day. A major BN line runs north from Sterling, Colorado, to Bridgeport, Nebraska, and then parallels the North Platte River west into Wyoming. This line carries over 50 million gross tons annually.

Coal dominates commodities transported through the area, predominantly in a west to east direction. Other major commodities are farm and food products.

Much of the coal traffic originates in Wyoming. Nebraska is considered a "bridge" state, meaning most rail operations are through traffic with only a small percentage of the operations originating or terminating in the state. After large increases in shipments between 1978 and 1980 due to coal production, BN tonnages have been increasing slightly over the last 3 years while UP shipments have been decreasing slightly.

Rail lines in the area are shown in Figure 2.6.2-1 and traffic data are summarized in Table 2.6.2-1.

Cheyenne is a focal point for the railroad network serving the western United States. Rail lines in Cheyenne are shown in Figure 2.6.2-2 and the schematic of the Cheyenne rail yard is shown in Figure 2.6.2-3.

UP has a railroad terminal located in downtown Cheyenne; the switching yard dominates this area of the city. The main rail yard handles about 400 to 600 cars per day in a flat switching operation. There are approximately 19 through trains per day in each direction, and the rail yard operates 24 hours a day with 3 shifts.

Railroad capacity analysis in Cheyenne must include overall system capacity as well as the capacity of the Cheyenne terminal itself. The existing capacity of the Cheyenne terminal is 850 railcars. Presently about 500 to 600 rail cars are handled per day at this facility. These figures would seem to indicate a high percentage of the capacity of this facility is used. However, not all of these cars are switched at any one time nor are they all in the yard. A train load of cars can be switched in 3 to 6 hours; consequently, the actual capacity used at any one time is much lower than these figures indicate. There are no data in the public domain on railroad activity at Cheyenne.

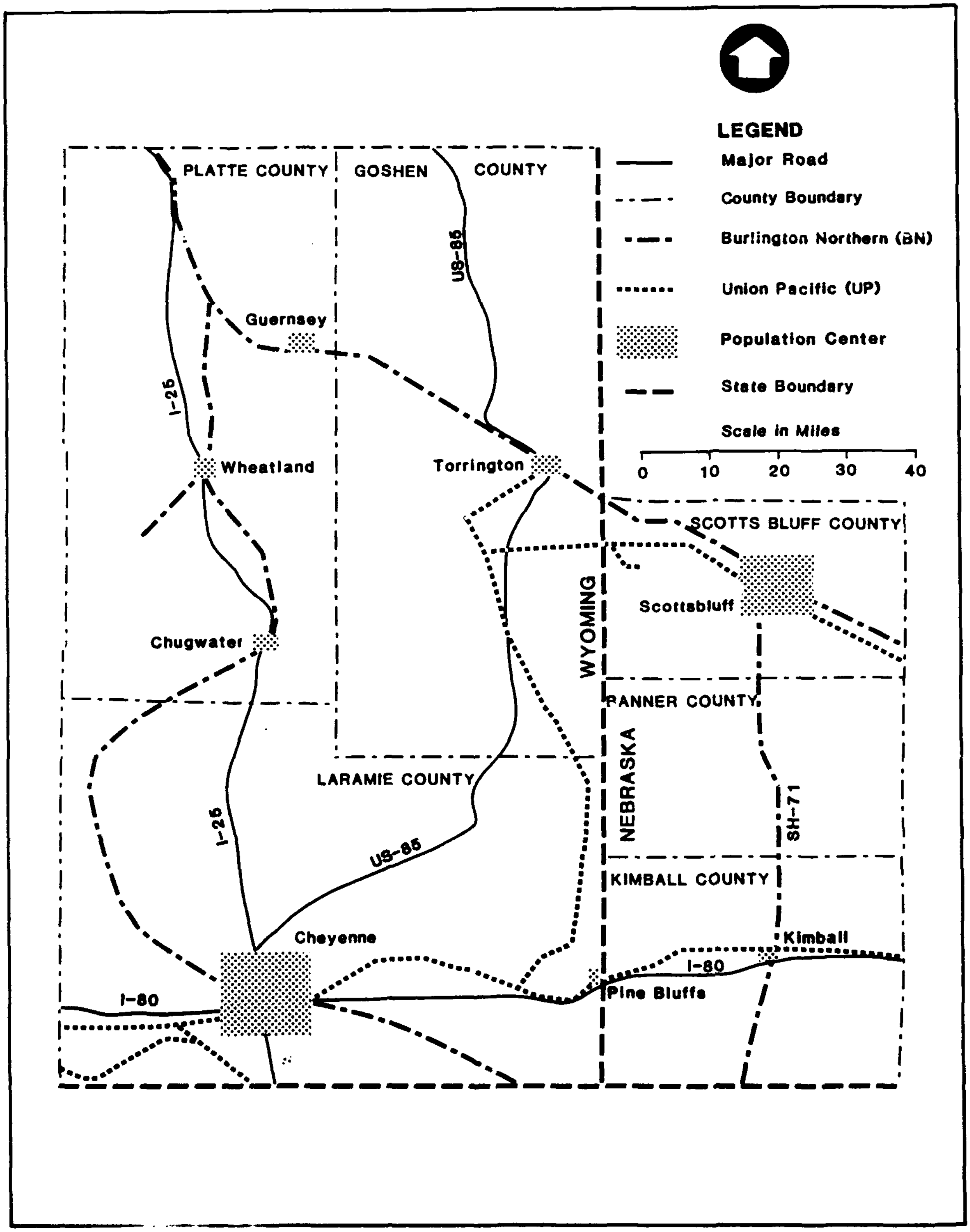


FIGURE 2.6.2-1 REGIONAL RAIL LINES

Table 2.6.2-1

STATE RAILROAD TRAFFIC DATA

	Wyoming 1981 (Million Tons)	Nebraska 1982 (Million Tons)
Union Pacific		
Originating	26.0	5.2
Through	28.2	41.0
Total	54.2	46.2
Terminating	1.9	2.5
Burlington Northern		
Originating	75.0	5.8
Through	13.0	18.2
Total	88.1	24.0
Terminating	3.8	7.5

Source: Wyoming Public Utility Services, 1983.
Nebraska Public Services Commission, 1983.

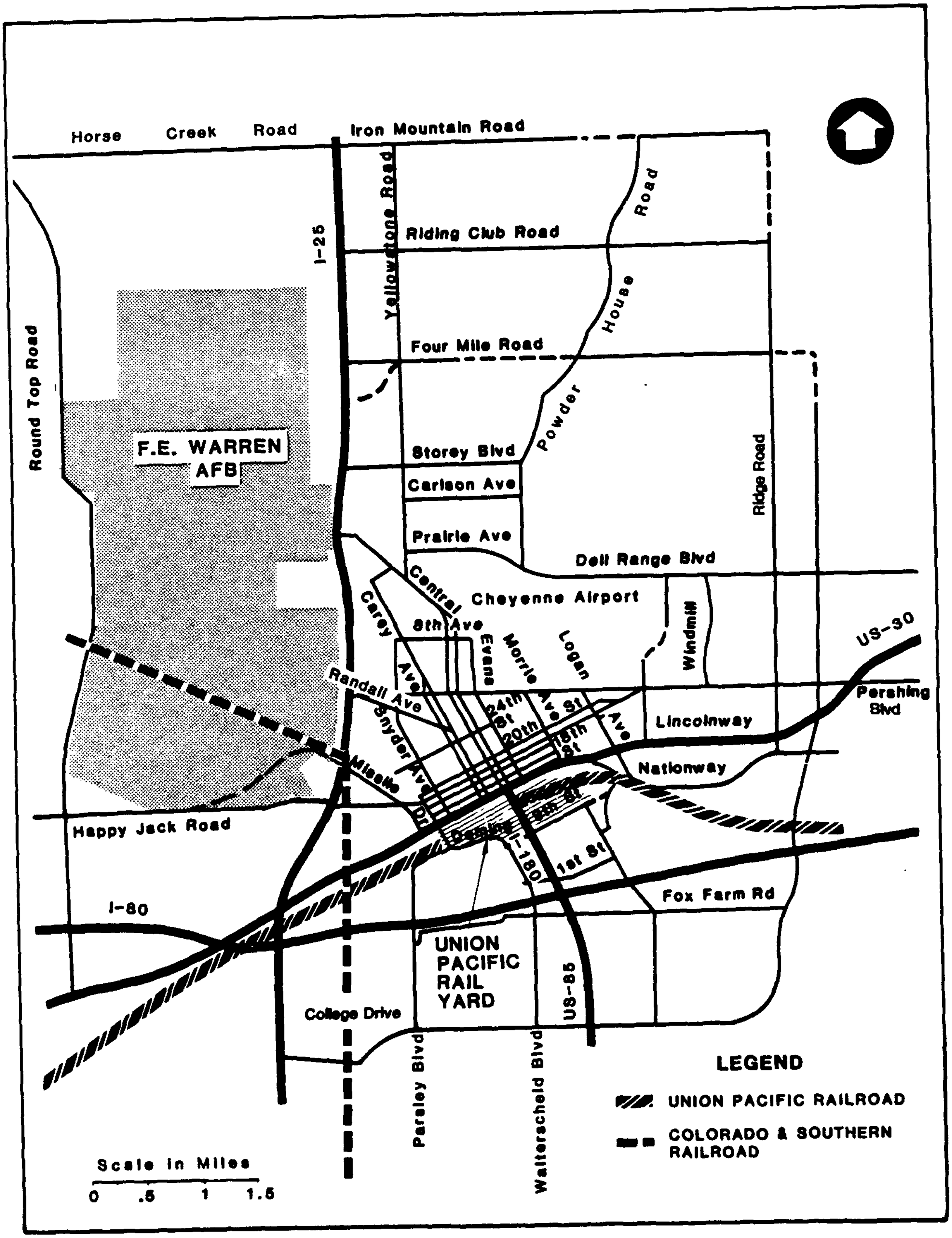


FIGURE 2.6.2-2 CHEYENNE RAIL LINES

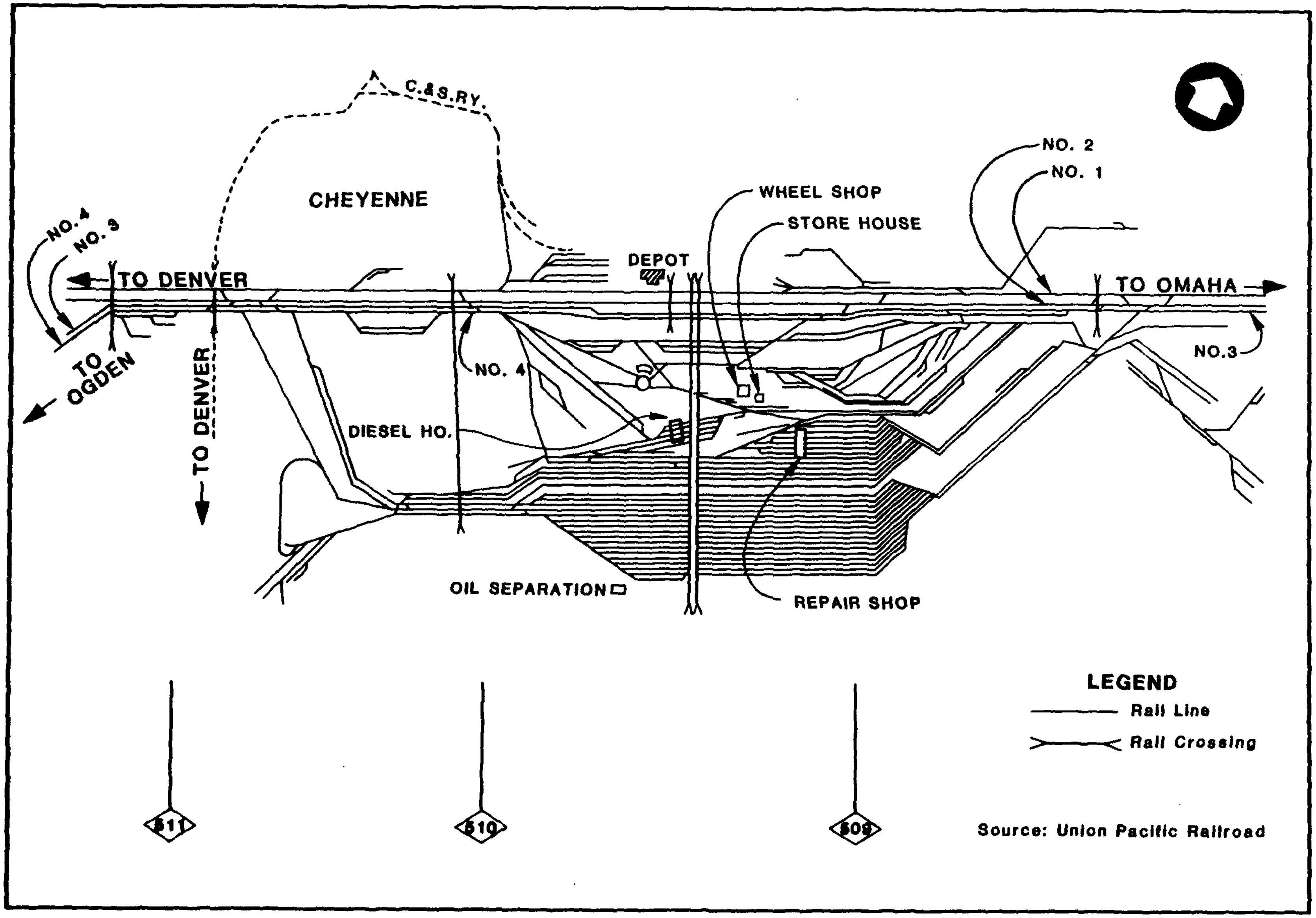


FIGURE 2.6.2-3 SCHEMATIC OF THE UNION PACIFIC RAILROAD TERMINAL AT CHEYENNE

Amtrak recently discontinued passenger service to Cheyenne. That service previously reported an annual ridership of 13,000 per year.

2.6.3 Aviation

2.6.3.1 Cheyenne Airport

2.6.3.1.1 General

The Cheyenne Airport is located approximately 1 mile north of the Central Business District on over 900 acres situated entirely within the city limits. The airport is the center for aviation activity in Laramie County and the adjacent region.

The Cheyenne Airport is operated under the control of the City of Cheyenne and Laramie County-supported Airport Board. This Board was jointly established on July 1, 1980, by the City of Cheyenne and Laramie County to manage, operate, and be responsible for the Cheyenne Airport. Prior to that date, the airport was operated by the City alone. The 5 nonpaid members of the Board are each appointed alternately by the City and County for 5-year terms. The Board appoints an airport manager to supervise the airport operations. The control tower operates from 6:00 AM to 10:00 PM daily, and the airport is open for aircraft operations 24-hours a day, 7-days a week. A plan of the airport is shown in Figure 2.6.3-1.

2.6.3.1.2 Airport Facilities

2.6.3.1.2.1 Runway

Runway 8/26 (east-west orientation) is 9,199 feet in length by 150 feet. There are 2 secondary runways, 12/30 (northwest-southeast orientation) and 16/34 (north-south orientation) which are respectively 6,691 feet and 4,997 feet long by 150 feet wide.

2.6.3.1.2.2 Pavement

The condition of the pavement has not been recently inventoried. Pavement structures based on the 1979, Cheyenne Municipal Airport Master Plan are summarized in Table 2.6.3-1.

In recent years, pavement maintenance requirements have been increasing. The pavement of runways 12/30 and 16/34 is in poor condition and requires continuous patching in areas of spalling concrete. Taxiways are in good shape. In order to improve the pavement structure, the FAA, in its Ten Year Plan (1980), recommended investments in paving and lighting of $3.7 million during the first 5 years and $2.4 million during the sixth through tenth years.

2.6.3.1.2.3 Buildings

There are approximately 49 buildings within the boundary of the airport with a total of 700,000 square feet (sq ft). Among them are 11 hangars of which 3 are owned by the Air National Guard or the U.S. Air Force, as well as a passenger terminal. The passenger terminal is 15,830 sq ft; however, the

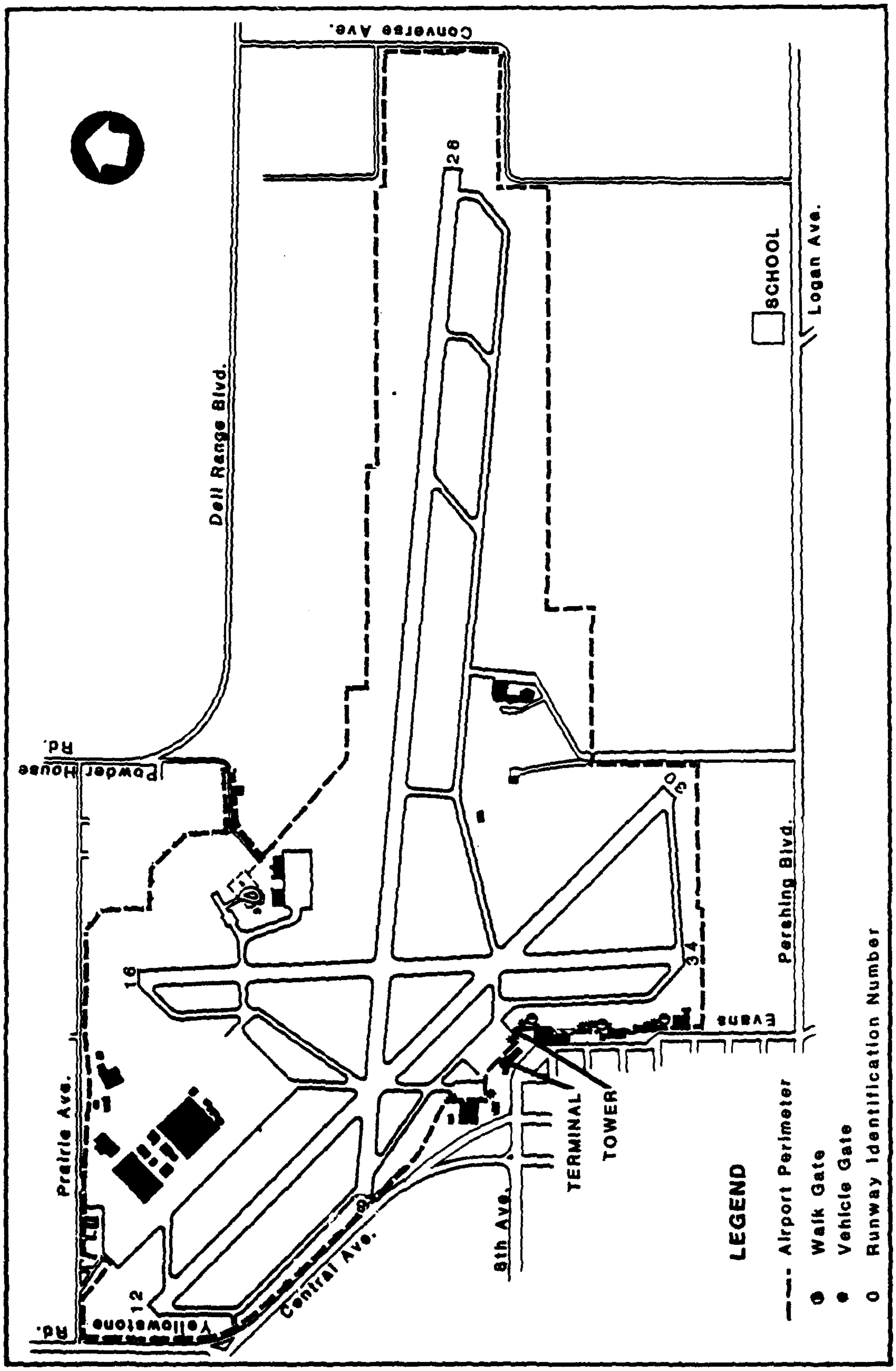


FIGURE 2.6.3-1 CHEYENNE AIRPORT

Table 2.6.3-1

CHARACTERISTICS OF THE AIRPORT PAVEMENT STRUCTURE

Facility	Type	Length x Width (Feet)	Load Capacity (Pounds)	Gear Configuration
R/W (8/26)	PCC	9,199 x 150	100,000 210,000	SW DT
R/W (16/34)	PCC	4,997 x 150	80,000 105,000 175,000	SW DW DT
R/W (12/30)	PCC	6,691 x 150	80,000 105,000 175,000	SW DW DT
T/W (parallel to R/W 8/26)	PCC		210,000	DT

Notes: R/W-Runway T/W-Taxiway

PCC-Portland Cement Concrete DT-Dual Tandem

SW-Single Wheel DW-Dual Wheel

Source: Cheyenne Municipal Airport Master Plan, 1979.

security area and the secured waiting area are only 570 sq ft. With more than a couple of flights within a short period of time, the terminal capacity can become strained. On occasions when Cheyenne is used as an alternate to Denver in bad weather, the terminal facilities become extremely overburdened.

2.6.3.1.2.4 Parking

Parking in the terminal area has been a problem in recent years. In the area adjacent to the terminal, there are several commercial establishments which compete with the airport users for a limited number of spaces. Of the 280 parking spaces available in the terminal area, approximately 60 spaces are reserved for nonairport users, 125 spaces are available to public users of the airport, and the remaining 95 spaces are reserved for official and commercial users. Additional parking lots serve the military and commercial facilities at the airport, but they are located some distance from the terminal. The lack of sufficient parking facilities for the public is identified as a shortcoming at the present level of activity by the airport's management.

The present problems of the airport can be summarized as inefficient traffic flow due to lack of defined passenger pick-up and drop-off zones, a series of islands which serve to confuse rather than direct traffic flow, and a deficiency in parking.

2.6.3.1.2.5 Utilities

The utilities serving the airport include telephone, water, gas, power, and sanitary and storm sewer lines.

2.6.3.1.2.6 Access

The airport is bounded by Prairie Avenue and Dell Range Boulevard to the north; Pershing Boulevard, Evans and Eighth Avenues to the south; Central Avenue and Yellowstone Road to the west; and Converse Avenue to the east. Major streets providing access to the airport are Warren Avenue, Central Avenue, Pershing Boulevard, Yellowstone Road, Evans Avenue, and Prairie Avenue.

Access to the airport is good due to its location within the city; however, the airport does create somewhat of a geographical barrier to travel through the city much like F.E. Warren AFB to the west and the UP rail yards to the south. The circuitous route needed to travel around the airport to the northern portion of the city discourages accelerated growth in that area.

2.6.3.1.2.7 Improvement Projects

Potential or proposed improvement projects at Cheyenne Airport are:

- Repaving of east 2,000 feet of Runway 8/26;
- Reconstructing Runway 12/30;
- Increasing the terminal size;

- Increasing the number of parking spaces available to the public at the terminal; and
- Relocating one fixed base operator and expansion of the other.

2.6.3.1.3 Airspace and Navigation

2.6.3.1.3.1 Air Traffic Control

The Denver Air Route Traffic Control Center (ARTCC) is the central authority issuing Instrument Flight Regulations (IFR) clearances in the Cheyenne area. It also provides radar surveillance enroute to Denver and other area airports. The airspace in the immediate vicinity of the airport is controlled by the control tower located near the passenger terminal.

2.6.3.1.3.2 Lighting

Runway 8/26 is lighted by a High Intensity Lighting System. Runway 12/30 is lighted by a Medium Intensity Lighting System. Runway end identifier lights are found only on runways 8 and 30.

2.6.3.1.3.3 Instrument Approach Aids

Runway 26 is a precision instrument approach runway with Category I Instrument Landing System (ILS). The approach angle for runway 8 is too steep for the ILS to work on that runway. Visual Approach Slope Indicators (VASI) are found on runways 8, 12, and 30.

2.6.3.1.3.4 Air Traffic Control Tower

Originally, the tower operated on a 24-hour a day basis, 7-days a week. Due to a lack of traffic during the late-night hours, the number of hours which the tower was open was reduced to 18 hours (6:00 AM to 12:00 AM) in June 1977. From April 1981 to August 1981, the hours of operation were further reduced to 16 hours a day (6:00 AM to 10:00 PM). During the period from August 3, 1981, through January 15, 1983, due to the air traffic controllers' strike the tower was open only from 8:00 AM to 6:00 PM, or 10 hours daily. Since January 1983, the normal hours of operation are 6:00 AM to 10:00 PM daily.

2.6.3.1.4 Airport Users

2.6.3.1.4.1 Commercial

Frontier Commuter and Rocky Mountain Airways currently serve Cheyenne. Frontier Airlines discontinued jet service to Cheyenne in the fall of 1983. Frontier Commuter operates three flights daily using Convair 580 turbo-prop aircraft. Rocky Mountain Airways has six daily flights to Denver, Colorado, three daily flights to Casper, Wyoming, and two daily flights to Scottsbluff, Nebraska. Rocky Mountain operates 50-passenger De Havilland Dash 7's and 19-passenger De Havilland Twin Otters.

Approximately 100,000 sq ft of parking space is available for 3 large commercial jets at the terminal. As many as 25 additional large aircraft may be parked at other points on the airport when traffic is diverted to Cheyenne from other airports.

2.6.3.1.4.2 General Aviation and Fixed-Base Operators

There are two fixed-base operators at the Cheyenne Airport, Aero Ventures and Sky Harbor Air Service. These operators provide a variety of services including fuel, aircraft rental and sales, air taxi and air ambulance service, flight training, and major maintenance. Aviation fuel is stored in underground tanks and transferred to aircraft by tank trucks. Fuel capacity is 142,000 gallons. Tiedowns and hangar space are available, as well as pilot and passenger lounges. There are a total of 14 multiengine and 69 single-engine aircraft based at Cheyenne. There are 108 tiedowns for small general aviation aircraft.

2.6.3.1.4.3 Military Use

Presently, F.E. Warren AFB has little influence on Cheyenne Airport. The only Air Force operations at the airport are the Civil Air Patrol and the Transient Alert which provides service for military aircraft. Fuel service for all military aircraft is provided through a contract with one of the fixed-base operators at the airport.

U.S. Air Force aircraft that occasionally use the airport include T-39 executive twin jet aircraft, C-141 four-engine jet transports, and Boeing KC-135 four-engine jet tankers.

Wyoming Air National Guard. Since the Wyoming Air National Guard was organized on August 10, 1946, as the 187th Fighter Squadron (SE), it has assumed many different roles. It presently operates as the 153rd Tactical Airlift Group. The primary mission of the Wyoming Air National Guard unit is to maintain aircraft proficiency in the Tactical Airlift Mission. The unit also supports the Air Force in point-to-point airlift missions throughout the United States. The Air National Guard provides and maintains crash, fire, and rescue equipment at Cheyenne Airport. Eight pieces of equipment, including three pumpers, a foam truck, and an ambulance are active. The equipment is jointly manned by the Air National Guard and the Airport Board which has three full-time employees assigned. Equipment and personnel are supplied by the Air Guard in exchange for a reduction in their joint user fee. The available service has been deemed adequate by airport officials.

The Air Guard is presently studying the possibility of adding four or five C-130s to its present fleet of eight to serve adjacent state units. The Air National Guard is also studying a shift from C-130s to C-141s in the 1990s.

Wyoming Army National Guard. Army National Guard activities include aircraft maintenance and individual and unit training. The Army Guard operates eight UH-IH helicopters, six OH-58A helicopters, and one T42 Beechcraft Baron twin-engine airplane. Between 4 and 8 helicopters are activated during training flights which usually operate within a 100-mile radius of the Cheyenne Airport on a schedule of 2 weekends per month and 2 nights per week.

2.6.3.1.5 Traffic Data

2.6.3.1.5.1 Passengers

Passenger traffic for 1981 and 1982 was very stable at about 25,900 passengers for both years. Traffic for 1983 was well ahead of that pace, projecting to 32,700 for the full year. Passenger traffic for 1981 through 1983 is summarized in Table 2.6.3-2.

In late 1982, airlines serving Cheyenne began to treat the community as a common fare market with Denver. For passengers, this meant fares from Cheyenne were the same or only slightly higher than the same flights from Denver. This contributed greatly to the increase in Cheyenne passengers.

The Cheyenne-Denver market is characterized by two types of passengers: local and interline passengers. Based upon discussions with the air carriers, the interline passengers are estimated to be approximately 80 percent of the market. The low percentage (20 percent) of local passengers is not surprising, since the driving-travel time between Denver and Cheyenne is 2 hours and most passengers, upon arriving in either city, would require a car.

2.6.3.1.5.2 Aircraft Operations

From 1979 to 1982, the recorded number of aircraft operations at Cheyenne Airport decreased considerably. This was primarily due to the poor economy, the air traffic controllers' strike, and the reduced hours of control tower operation. The largest affected category was general aviation, dropping from 39,565 operations in 1979 to 25,105 in 1982. However, operations began to increase in 1983, due to longer control tower operating hours and an improving economy. Projecting from the first half of 1983 to the full year, operations increased from 55,735 in 1982 to approximately 75,000 for 1983. Air traffic operations for 1979 through 1983 are summarized in Table 2.6.3-3.

Seasonal peaks occur in the months of July and August. Traffic drops off in the winter months with the lows generally occurring in December. Table 2.6.3-4 is a statistical summary of the air operations at Cheyenne for 1979 to 1983. The average of the maximum daily number of aircraft operations in a month is 6 percent of the monthly total. The peak monthly total occurs in July (except for 1982) with values between 125 to 134 percent of the monthly average. Other values in the table give the relationship between different types of air traffic to totals.

2.6.3.2 Area Airports

Other than Cheyenne Airport, the study area is dominated by small general aviation facilities. Only Scotts Bluff County Airport in Scottsbluff, Nebraska, has scheduled commercial air carrier service. The remainder are in the basic utility and general utility categories.

Guernsey-Platte County Airport is jointly owned by the Town of Guernsey and the County of Platte, but is operated by the Wyoming National Guard as a training area, primarily during the summer. There is one based aircraft and annual operations of about 16,000, consisting mostly of military operations including helicopters. Runway 12/30 is 4,000 feet long and 100 feet wide.

Table 2.6.3-2

CHEYENNE AIRPORT
AIR PASSENGER STATISTICS - 1981, 1982 AND 1983 (AIR CARRIERS ONLY)

	Frontier			Rocky Mountain Airways						
Month	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Total Enplaning Passengers	Total Deplaning Passengers	Total Passengers	Total Flights
1983										
May	54	1,068	833	280	1,820	1,971	2,888	2,804	5,692	334
April	67	1,453	1,275	242(Est.)	1,480(Est.)	1,454	2,861	2,729	5,590	309
March	76	1,533	1,396	203	996	938	2,529	2,334	4,863	279
February	79	1,791	1,550	203	961	996	2,752	2,546	5,298	282
January	85	1,747	1,551	220	851	1,049	2,598	2,600	5,198	305
TOTAL 1983:	361	7,592	6,605	725	4,224	4,363	13,628	13,013	26,641	1,509
Average	72	1,518	1,321	145	845	873	2,726	2,603	5,328	302
Passengers/ Flight	N/A	21	18	N/A	6	6	N/A	N/A	N/A	N/A

Table 2.6.3-2 Continued
CHEYENNE AIRPORT AIR PASSENGER
STATISTICS - 1981, 1982 AND 1983
(AIR CARRIERS ONLY)

	Frontier			Rocky Mountain Airways						
Month	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Total Enplaning Passengers	Total Deplaning Passengers	Total Passengers	Total Flights
1982										
December	80	1,678	1,547	212	1,201	1,162	2,879	2,709	5,588	292
November	80	1,373	1,223	210	943	979	2,316	2,202	4,518	290
October	84	1,179	1,081	227	1,061	1,078	2,240	2,159	4,399	311
September	75	1,079	968	215	1,080	1,243	2,159	2,211	4,370	290
August	83	1,223	946	248	1,200	1,182	2,423	2,128	4,551	331
July	83	1,077	1,197	175	1,070	1,099	2,077	2,296	4,373	258
June	76	854	774	234	1,178	1,379	2,032	2,153	4,185	310
May	96	1,058	934	202	1,015	1,133	2,073	2,067	4,140	298
April	113	978	980	197	1,062	1,087	2,040	2,067	4,107	310
March	130	1,077	829	193	1,036	1,226	2,113	2,055	4,168	323
February	93	791	667	174	886	1,054	1,677	1,721	3,398	267
January	108	792	625	203	1,010	1,176	1,802	1,801	3,603	311
TOTAL 1982:	1,101	13,089	11,771	2,490	12,742	13,798	25,831	25,569	51,400	3,591
Average	92	1,091	981	208	1,062	1,150	2,153	2,131	4,283	299
Passengers/ Flight	N/A	12	11	N/A	5	6	N/A	N/A	N/A	N/A

Table 2.6.3-2 Continued
CHEYENNE AIRPORT AIR PASSENGER
STATISTICS - 1981, 1982 AND 1983
(AIR CARRIERS ONLY)

	Frontier			Rocky Mountain Airways						
Month	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Revenue Flights	Number Enplaning Passengers	Number Deplaning Passengers	Total Enplaning Passengers	Total Deplaning Passengers	Total Passengers	Total Flights
1981										
December	107	944	852	198	1,078	1,196	2,022	2,048	4,070	305
November	90	925	808	196	863	1,020	1,788	1,828	3,616	286
October	89	983	809	198	1,148	1,240	2,131	2,049	4,180	287
September	108	1,052	906	223	1,040	1,259	2,092	2,165	4,251	331
August	143	1,134	1,004	233	844	927	1,978	1,931	3,909	376
July	147	1,597	1,644	266	1,331	1,509	2,928	3,153	6,081	413
June	146	1,383	1,394	227	898	1,066	2,281	2,460	4,741	373
May	112	1,446	1,253	177	799	1,019	2,245	2,272	4,517	289
April	114	1,394	1,548	157	670	843	2,064	2,391	4,455	271
March	118	1,523	1,276	166	697	929	2,220	2,205	4,425	284
February	101	1,266	1,168	162	695	825	1,961	1,993	3,954	263
January	115	1,547	1,268	178	734	1,039	2,281	2,307	4,588	293
TOTAL 1981:	1,390	15,194	13,930	2,381	10,797	12,872	25,991	26,802	52,793	3,771
Average	116	1,266	1,161	198	900	1,073	2,166	2,234	4,399	314
Passenger/ Flight	N/A	11	10	N/A	5	5	N/A	N/A	N/A	N/A

Note: N/A - Data not available.

Source: Flight fees computation and statistics accumulation, monthly report, May, 1983, through January, 1981.

Table 2.6.3-3

AIR TRAFFIC DATA FOR CHEYENNE AIRPORT - 1979 to 1983

Month	Itinerant AC	Itinerant AT	Itinerant GA	MI	Total Itinerant	Local Civil.	Local Military	Total Local	Total Monthly	Maximum[1] OPS/Day
1983										
June	172	669	2,763	425	4,029	1,754	561	2,315	6,344	282
May	176	631	2,208	286	3,301	1,274	634	1,908	5,209	276
April	189	483	1,830	410	2,912	1,418	524	1,942	4,854	326
March	212	483	1,663	306	2,664	885	683	1,568	4,232	288
February	217	431	2,229	338	3,215	1,455	835	2,290	5,505	325
January	194	368	2,194	305	3,061	1,672	782	2,454	5,515	297
TOTAL 1983	1,160	12,065	12,887	2,070	15,582	8,458	4,019	12,477	31,659	1,794
Average	193	510	2,148	345	2,597	1,410	670	2,080	5,276	299
1982										
December	98	259	1,538	271	2,166	992	472	1,464	3,630	313
November	93	269	1,988	276	2,626	1,380	574	1,954	4,580	285
October	104	206	2,110	285	2,785	1,422	578	2,000	4,785	302
September	84	275	2,041	228	2,624	1,352	310	1,662	4,286	224
August	111	317	2,908	304	3,640	1,073	578	1,651	5,291	228
July	108	285	2,811	275	3,479	1,188	490	1,678	5,157	252
June	97	355	2,382	306	3,140	1,269	546	1,815	4,955	292
May	114	311	2,133	289	2,847	1,410	552	1,962	4,809	260
April	167	406	1,876	321	2,770	1,349	671	2,020	4,790	297
March	124	403	1,824	315	2,666	1,255	766	2,021	4,687	320
February	109	351	1,909	266	2,635	1,393	637	2,030	4,665	270
January	119	336	1,585	242	2,282	1,328	490	1,818	4,100	246
TOTAL 1982	1,328	3,853	25,105	3,378	33,660	15,411	6,664	22,075	55,735	3,289
Average	111	321	2,092	282	2,805	1,284	555	1,840	4,645	274

Table 2.6.3-3 Continued

AIR TRAFFIC DATA FOR CHEYENNE AIRPORT - 1979 to 1983

Month	Itinerant AC	Itinerant AT	Itinerant GA	MI	Total Itinerant	Local Civil.	Local Military	Total Local	Total Monthly	Maximum[1] OPS/Day
1981										
1981										
December	117	403	1,643	313	2,476	1,070	899	1,969	4,445	260
November	119	436	2,197	320	3,072	1,613	828	2,441	5,513	325
October	121	410	1,984	303	2,818	1,272	664	1,936	4,754	268
September	165	379	2,752	315	3,611	1,546	702	2,248	5,859	332
August	225	399	3,187	343	4,154	1,651	720	2,361	6,515	304
July	383	569	4,344	519	5,815	2,626	917	3,543	9,358	459
June	374	485	3,672	517	5,048	2,709	955	3,664	8,712	420
May	300	410	2,773	406	3,889	2,182	852	3,034	6,923	464
April	308	404	3,381	458	4,551	3,181	785	2,966	8,517	454
March	349	404	2,820	402	3,975	2,457	899	3,356	7,331	484
February	264	414	2,746	391	3,815	1,777	794	2,571	6,386	385
January	295	435	3,825	431	5,006	3,102	1,113	4,215	9,221	522
TOTAL 1981	3,020	5,148	35,324	4,718	48,230	25,186	10,120	35,304	83,534	4,677
Average	252	429	2,944	393	4,019	2,099	844	2,942	6,961	390
1980										
1980										
December	301	436	2,282	320	3,339	1,450	943	2,393	5,732	
November	306	418	2,636	345	3,705	1,908	647	2,555	6,260	
October	336	467	3,609	443	4,855	2,610	962	3,572	8,427	
September	404	458	3,558	494	4,914	2,447	1,132	3,579	8,493	
August	501	502	3,633	478	5,114	2,213	802	3,015	8,129	
July	484	562	4,285	437	5,768	2,394	825	3,219	8,987	
June	498	524	3,444	473	4,939	2,336	776	3,112	8,051	
May	504	461	2,835	333	4,133	2,963	574	3,537	7,670	
April	495	408	2,771	451	4,125	2,801	1,000	3,801	7,926	

Table 2.6.3-3 Continued

AIR TRAFFIC DATA FOR CHEYENNE AIRPORT - 1979 to 1983

Month	Itinerant AC	Itinerant AT	Itinerant GA	MI	Total Itinerant	Local Civil.	Local Military	Total Local	Total Monthly	Maximum[1] OPS/Day
1980 Continued					1980					
March	460	476	2,361	316	3,615	1,798	480	2,286	5,901	
February	418	379	2,331	332	3,460	1,417	608	2,025	5,485	
January	438	506	1,935	264	3,143	1,312	734	2,046	5,189	
TOTAL 1980	5,145	5,597	35,680	4,686	51,110	25,649	9,491	35,140	86,250	
Average	429	466	2,973	391	4,259	2,137	791	2,928	7,188	
					1979					
1979										
December	542	452	2,344	338	3,676	N/A	N/A	2,420	6,096	
November	454	373	2,680	409	3,916	N/A	N/A	2,513	6,429	
October	532	437	3,309	522	4,800	N/A	N/A	3,120	7,920	
September	503	417	3,859	414	5,193	N/A	N/A	3,450	8,043	
August	564	480	4,114	547	5,705	3,089	742	3,831	9,536	
July	554	483	4,740	504	6,281	3,326	699	4,205	10,306	
June	563	512	3,680	536	5,291	N/A	N/A	3,961	9,252	
May	573	391	3,125	438	4,527	N/A	N/A	3,978	8,505	
April	590	533	3,666	431	5,220	N/A	N/A	3,290	9,443	
March	552	521	2,679	457	4,209	N/A	N/A	3,290	7,499	
February	552	756	2,708	469	4,336	N/A	N/A	3,499	7,785	
January	613	756	2,661	371	4,401	2,489	928	3,417	7,818	
TOTAL 1979	6,592	5,962	39,565	5,436	57,555	31,860	9,114	40,974	99,232	
Average	549	497	3,297	453	4,796	2,655	760	3,415	8,269	

Notes:
- OPS - Operations
- AC - Air Carrier
- AT - Air Taxi
- GA - General Aviation
- MI - Military
- Itinerant - Between Airports
- Local - Touch and go, i.e., return to Cheyenne Airport
- 1 Data not available for 1979 and 1980.
- N/A - Data not available.

Source: FAA Control Tower, 1983.

Table 2.6.3-4

STATISTICAL SUMMARY OF CHEYENNE AIRPORT OPERATIONS - 1979 to 1983

Month	% Maximum[1] of Total Monthly	% Average of Total Yearly	Season-ality	Itinerant As % of Total	Local As % of Itinerant	Commercial As % of Itinerant	General Aviation As % of Itinerant	Military As % of Itinerant
1983								
2	6	50	100	58	71	20	69	11
1	5	50	100	56	80	18	72	10
Average	6	50	100	57	76	19	70	10
1982								
12	9	7	78	60	68	16	71	13
11	6	8	99	57	74	14	76	11
10	6	9	103	58	72	14	76	10
9	5	8	92	61	63	14	78	9
8	4	9	114	69	45	12	80	8
7	5	9	107	67	48	11	81	8
6	6	9	104	63	58	14	76	10
5	5	9	104	59	69	15	75	10
4	6	9	103	58	73	21	68	12
3	7	8	101	57	76	20	68	12
2	6	8	100	56	77	17	72	10
1	6	7	88	56	80	20	69	11
Average	6	8	100	60	66	15	75	10
1981								
12	6	5	64	56	80	21	66	13
11	6	7	79	56	79	18	72	10
10	6	6	68	59	69	19	70	11
9	6	7	84	62	62	15	76	9
8	5	8	94	64	57	15	77	8
7	5	11	134	62	61	16	75	9

Table 2.6.3-4 Continued

STATISTICAL SUMMARY OF CHEYENNE AIRPORT OPERATIONS - 1979 to 1983

Month	% Maximum[1] of Total Monthly	% Average of Total Yearly	Season-ality	Itinerant As % of Total	Local As % of Itinerant	Commercial As % of Itinerant	General Aviation As % of Itinerant	Military As % of Itinerant
1981 continued								
6	5	10	125	58	73	17	73	10
5	7	8	99	56	78	18	71	10
4	5	10	122	53	87	16	74	10
3	7	9	105	54	84	19	71	10
2	6	8	91	60	67	18	72	10
1	6	11	132	54	84	15	76	9
Average	6	8	100	58	73	17	73	10
1980								
12		7	80	58	72	22	68	10
11		7	87	59	69	20	71	9
10		10	117	58	74	17	74	9
9		10	118	58	73	18	72	10
8		9	113	63	59	20	71	9
7		10	125	64	56	18	74	8
6		9	112	61	63	21	70	10
5		9	107	54	86	23	69	8
4		9	110	52	92	22	67	11
3		7	82	61	63	26	65	9
2		6	76	63	59	23	67	10
1		6	72	61	65	30	62	8
Average		8	100	59	69	21	70	9
1979								
12		6	73	60	66	27	64	9
11		6	77	61	64	21	68	10
10		8	96	61	65	20	69	11
9		9	105	60	66	18	74	8
8		10	115	60	67	18	72	10
7		10	125	61	67	17	75	8

Table 2.6.3-4 Continued

STATISTICAL SUMMARY OF CHEYENNE AIRPORT OPERATIONS - 1979 to 1983

Month	% Maximum[1] of Total Monthly	% Average of Total Yearly	Season-ality	Itinerant As % of Total	Local As % of Itinerant	Commercial As % of Itinerant	General Aviation As % of Itinerant	Military As % of Itinerant
1979 continued								
6		9	112	57	75	20	70	10
5		9	103	53	88	21	69	10
4		10	114	55	63	22	70	8
3		8	91	56	78	25	64	11
2		8	94	56	81	27	62	11
1		8	95	56	78	31	60	8
Average		8	100	58	71	22	69	9

Notes: 1 Data not available for 1979 and 1980.

% Maximum of Total Monthly = (Maximum Operations/day)/Total Monthly Operations) x 100

% Average Total = (Total Monthly Operations/Average Monthly Operations) x 100

Itinerant As % of Total = (Total Itinerant Operations/Total Monthly Operations) x 100

Local As % of Itinerant = (Total Local/Total Itinerant) x 100

Commercial As % of Itinerant = (Air Carrier and Taxi/Total Itinerant) x 100

General Aviation As % of Itinerant = (General Aviation/Total Itinerant) x 100

Military As % of Itinerant = (Military Itinerant/Total Itinerant) x 100

Source: FAA Control Tower, 1983.

Runway 16/34 is 3,200 feet long and 100 feet wide. Both runways are gravel surfaced.

Phifer Field in Wheatland is a general utility airport located 1 mile east of town at an elevation of 4,775 feet. With 22 single-engine based aircraft, Phifer Field has almost 18,000 annual operations. Its single lighted runway is 4,174 feet long and 75 feet wide with an asphalt surface.

Torrington Municipal Airport is a general utility airport located 1 mile east of town at an elevation of 4,206 feet. There are 25 single-engine planes and 1 helicopter based at the airport. Total annual operations are approximately 5,700. Runway 10/28 is 5,200 feet long and 75 feet wide, runway 4/22 is 2,800 feet long and 60 feet wide. Both runways have an asphalt pavement and runway 10/28 is lighted with Medium Intensity Runway Lights and VASI-2 lights. A fixed base operator provides aircraft sales, charter, rental, instruction, fuel, and repairs.

Kimball Municipal Airport is located three miles south of the city at an elevation of 4,948 feet. It is operated by an airport manager and overseen by a city airport authority. Kimball has 20 single-engine and 3 multiengine based aircraft with approximately 7,500 annual operations. Runway 11/29 is 3,750 feet long by 75 wide with an asphalt pavement and runway lights. Runways 5/23 and 17/35 are 2,500 and 2,100 feet long, respectively, and 170 feet wide; both are turf runways. This airport was closely studied as Kimball is proposed as a dispatch station during the project construction phase.

Scotts Bluff County Airport is County owned and operated. It is located 3 miles northeast of Scottsbluff at an elevation of 3,965 and is classified as an air carrier airport. Scheduled air service is provided to Scotts Bluff County Airport by two airlines. Frontier Airlines operates two daily flights to Denver and two daily flights to North Platte, Nebraska, using DC-9s and 737s. Rocky Mountain Airways operates 2 daily flights to Cheyenne, Wyoming, and 1 to Denver, Colorado using 50-passenger DeHavill and Dash 75 and 20 passenger Twin Otters. Approximately 20,000 passengers enplane at Scotts Bluff annually. Six thousand of the approximately 37,000 annual operations are air carrier.

Scotts Bluff has 65 based aircraft of which 57 are single-engine. Three runways are over 8,000 feet long and are rated to carry any aircraft within restricted operations.

2.6.3.2.1 Denver-Stapleton International Airport

Stapleton International Airport is the major air carrier hub located approximately 95 miles south of Cheyenne on the east edge of Denver at an elevation of 5,330 feet. Stapleton is owned and operated by the City and County of Denver. The airport has four runways and two taxiways that are utilized as runways on a temporary, restricted-use basis. Two of the runways can accommodate all current civil aircraft, and all but one are lighted. There are three ILS runways which include the capability of Category II and III approaches. There are also two non-directional beacon approaches to the airport. Runway conditions are summarized in Table 2.6.3-5.

There are approximately 500 aircraft based at Stapleton Airport with nearly 500,000 annual operations.

Table 2.6.3-5

DENVER STAPLETON INTERNATIONAL AIRPORT

Runway	Runway Length	Runway Width	Surface Composition
8L/26R	7,926[a]	250	Asphalt-Concrete
8R/26L	10,010	150	Asphalt
17L/35R	12,000	200	Asphalt
17R/35L	11,500	150	Concrete
17C/35C[b]	6,500	100	Concrete
7/25[b]	5,020	75	Concrete

Notes: a 8L Displaced threshold-landing length 6,699 feet.
b Taxiways used as runways on a temporary, restricted-use basis.

2.6.3.2.2 Military Airports

There are only two military fields in the area. Guernsey, operated by the Wyoming Army National Guard, has one aircraft based there. Future plans call for a joint-use field there.

The Guernsey Training Site, adjacent to the airport, is used 3 weekends per month by 4 to 6 rotary wing aircraft. During training, aircraft fly at altitudes between 0 feet and 500 feet above ground level. During the period June through August, the training area is used continuously by aviation units employing 10 to 24 rotary wing aircraft. These operations vary from 20 to 100 personnel with the base of operations at the Guernsey Airport.

Future plans include use of C-130 transport aircraft into Guernsey Airport, expanding to two aircraft two times per month.

The other military airport in the ROI is Buckley Field near Denver. Primary aircraft based there are A-7 helicopters. The Colorado Air National Guard operating out of Buckley also occasionally use the Guernsey, Wyoming training area.

2.6.3.2.3 Memorial Hospital Heliport - Cheyenne

The City of Cheyenne and Laramie County medical services, in cooperation with other agencies, utilize two locations in Cheyenne for the airlift of seriously ill patients. The Cheyenne Municipal Airport has facilities for receiving airlifted patients who are then transported to Memorial Hospital by A-1 Ambulance Service. The travel time varies but is in the range of three to seven minutes, depending on conditions. Another location is a parking lot on Hot Springs Road, across from DePaul Hospital, which is used as an emergency heliport. The parking lot is the property of Holy Trinity, a Catholic church. The present system is not ideal but appears to be satisfactory.

Discussions have taken place regarding the emergency service deficiencies at Memorial Hospital with consideration being given to constructing an heliport

at the hospital. Previous analyses have pointed out problems with locating an heliport close to Memorial Hospital, such as the existence of a 33,000 volt power line which would have to be relocated, and the proximity of buildings, trees, and traffic.

2.6.4 Public Transit

Public transit in Cheyenne is provided by both buses and taxis. Jitney, Inc., a privately owned company, operates the public transit system in Cheyenne. The system has been in operation since the fall of 1981, and currently operates two routes. The routes are shown in Figure 2.6.4-1. One bus operates on each route at 60-minute intervals.

Service is provided from 7:00 AM to 6:00 PM from Monday through Friday and from 9:00 AM to 6:00 PM on Saturdays. No late-night or Sunday service is provided. Jitney, Inc. has two 20-passenger vehicles, a 30-passenger bus with a wheelchair lift, and a 24-passenger school bus. A zone fare system is used.

It is estimated that the system currently carries between 300 to 400 passengers per week with increases expected as people become more aware of the transit system as a viable transportation alternative.

In addition to this system, the U.S. Air Force operates a transit system at F.E. Warren AFB. This system is intended to provide circulation within the base. Two-way service is available on the Warren route with service offered at 30-minute headways between 6:00 AM to 8:00 AM, 11:00 AM to 1:00 PM, and 4:00 PM to 6:00 PM. The F.E. Warren AFB transit system is within about one-third mile of the main base entrance, which is also served by Jitney, Inc., thus a transfer connection could be made between the two systems.

In addition to the above, Laramie County School District No. 1 operates school buses within the western two-thirds of Laramie County. The District operates 47 bus routes for school children. The buses are garaged near the junction of Interstate 80 and College Drive.

Taxi service in Cheyenne is provided by Checker-Yellow Cab which operates 24 hours a day on a demand call basis, usually utilizing 10 taxis during the day and 5 taxis at night. It averages 400 fares per day, with single passenger trips constituting approximately 90 percent of the fares. Peak hours are 7:00 AM to 9:00 AM and 3:00 PM to 6:00 PM.

Rental cars are availbale in Cheyenne through major automobile leasing companies.

Intercity bus service to Cheyenne is provided by Greyhound and Trailways.

Trailways has two routes, both operating on a north-south axis. Route 8505 runs two round trips daily from Billings, Montana, to Denver, Colorado, and services the communities of Wheatland, Chugwater, and Cheyenne, Wyoming, and Fort Collins and Denver, Colorado. Trailways Route 8506 runs three round trips daily from Rapid City, South Dakota, to Denver, Colorado. Service on this route is provided to Torrington and Cheyenne, Wyoming, and Fort Collins and Denver, Colorado. An additional two round trips daily are provided between Cheyenne, Fort Collins, and Denver.

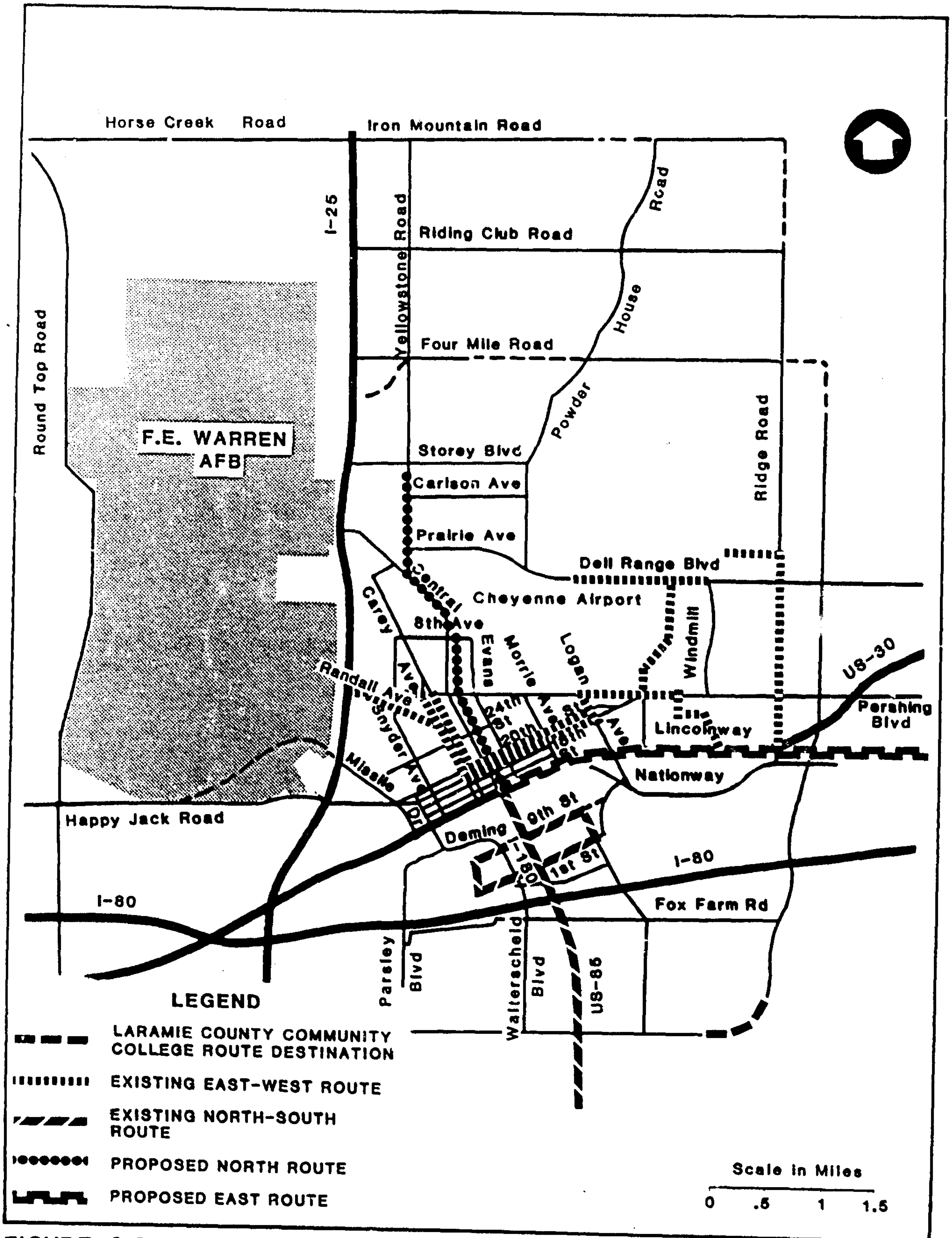


FIGURE 2.6.4-1 PRESENT AND PLANNED BUS ROUTES IN THE CHEYENNE AREA

Trailways operates with 46 passenger buses and reports an average 45 percent load on its routes in the area.

Greyhound has two routes serving the study area. Route 558 operates four round trips daily from Chicago, Illinois, to Salt Lake City, Utah, and services the communities of Laramie, Cheyenne, and Pine Bluffs in Wyoming and Kimball, Nebraska. Route 571 operates three round trips daily between Cheyenne, Wyoming, to St. Louis, Missouri, and provides service to Greeley and Denver, Colorado.

Greyhound reports approximately 19,000 passengers boarding in Cheyenne in 1982 with an approximately equal number deboarding. About 200,000 passengers traveled through Cheyenne.

2.6.5 Pedestrian and Bicycle Facilities

The City of Cheyenne adopted a formal bikeway plan in December 1975. The plan, prepared by the Cheyenne-Laramie County Regional Planning Office, established a general development framework for a master bikeway network and set the stage for securing funds for implementation. In 1977 the City utilized community development funds to employ a consultant to prepare detailed construction drawings for the entire bikeway network which included bike routes, bike paths, and bike lanes. The City of Cheyenne, in its effort to respond to the need and demand for bikeways, adopted a revised bikeway system plan.

Those plans have been implemented as monies become available; however, bikeways are not a major priority of the City of Cheyenne. Recent sections of bikeway improvements have occurred as a result of associated projects.

Figure 2.6.5-1 illustrates the existing and proposed bikeway system. This consists of bike paths, lanes, and designated routes. Approximately 40 percent of the system has been completed within the last 8 years. The majority of routes, paths, and lanes exist in the northern sections of the city primarily due to the presence of large recreational facilities and major street renovation projects such as Dell Range Boulevard, Pershing Boulevard, 19th Street, and Logan Avenue. Major improvements in the south include the Interstate 180 Corridor project, which will include bike lanes, and Optimist Park. The Optimist Park project includes a bike and pedestrian path which is anticipated to be linked with the Village Creek South redevelopment project (a nine block renewal project undertaken in concert with private and public funds). No additional development is anticipated to occur this fiscal year.

The downtown area has an extensive pedestrian network consisting totally of sidewalks. Except for the State Office complex there are no tunnels or skyways in Cheyenne. The surrounding areas of the Central Business District consist of a myriad of sidewalks and paved streets with intermittent areas of graveled streets and no sidewalks. Specific areas of Cheyenne have concentrated areas void of formal pedestrian paths. Sections of South Cheyenne and northeast Cheyenne are prominent among the areas with no sidewalks or paved streets. In these areas, the level of pedestrian and bicycle facilities is inadequate.

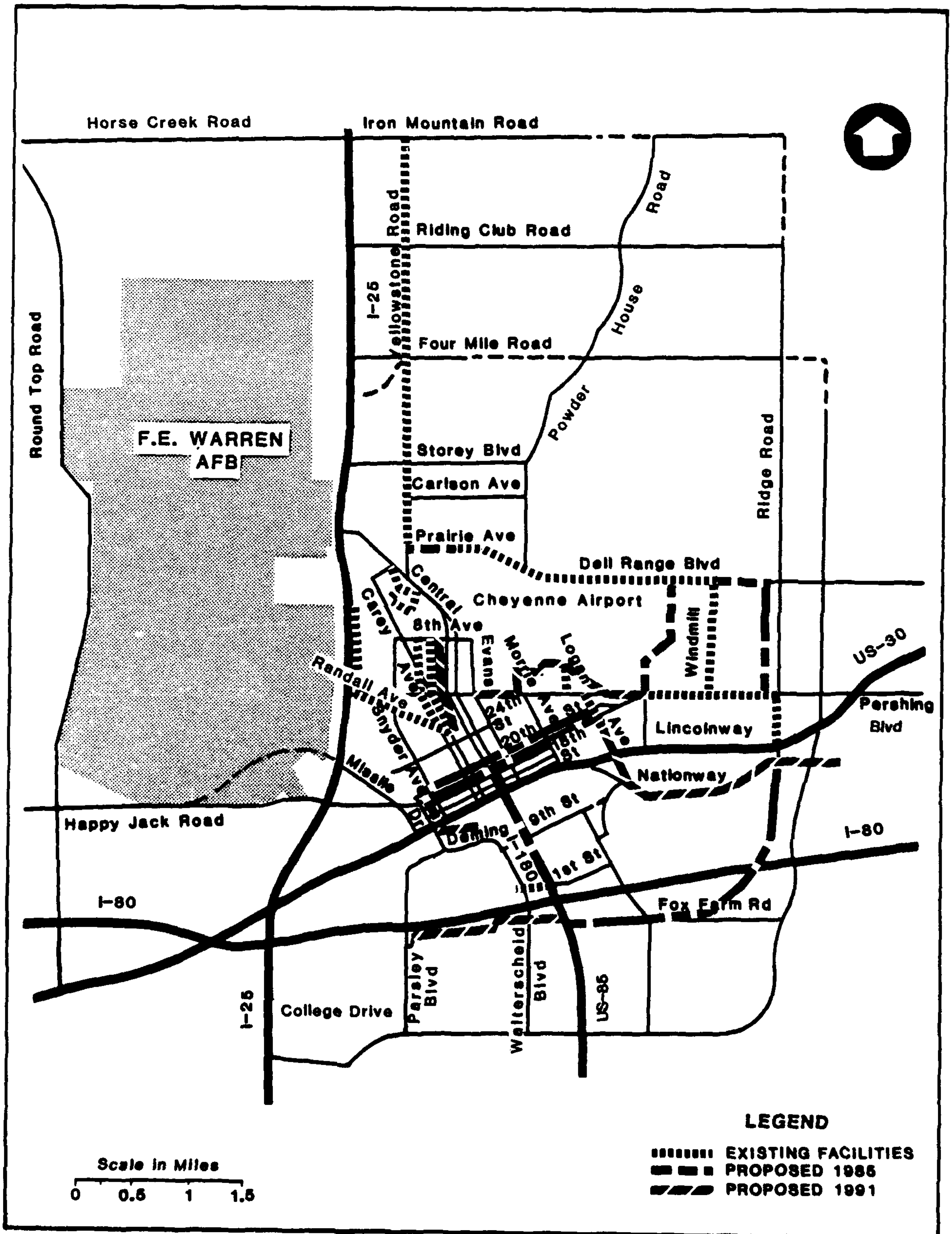


FIGURE 2.6.5-1 EXISTING AND PROPOSED BIKEWAY SYSTEM

The 3-year average frequency of bicycle/vehicular accidents has remained almost constant over the past decade. The 1972 to 1974 3-year average is 17.0 accidents per year. The 1980 to 1982 3-year average is 17.3 accidents per year.

3.0

ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND UNAVOIDABLE IMPACTS

3.0 ENVIRONMENTAL CONSEQUENCES, MITIGATION MEASURES, AND UNAVOIDABLE IMPACTS

3.1 Analytic Methods

In order to maximize the assessment process, data collection and analysis efforts focused on the Area of Concentrated Study (ACS) within the Region of Influence (ROI) where impacts were projected to be concentrated. This area was based on the location of F.E. Warren AFB and the 100 Peacekeeper in Minuteman Silos Launch Facilities (LFs). This area also focused attention on those portions of the ROI where appreciable project-induced population growth is anticipated since transportation systems in these areas would also be more directly affected by the project.

3.1.1 Roads

3.1.1.1 Population Centers

3.1.1.1.1 Travel Demand

3.1.1.1.1.1 Baseline Future - No Action Alternative

The time period for peak project-related housing demand in Cheyenne will be 1985. The normal operation period will begin in 1990. Thus, these years were used for baseline conditions. Population forecasts for baseline time periods for the Cheyenne area formed the basis for determining baseline housing needs. These housing units were allocated to various parts of the Cheyenne area where the anticipated growth could logically occur.

Discussions with city and state officials provided information on probable roadway improvements which would occur in the next 5 to 10 years. These changes were incorporated into the roadway model network for future years for the Cheyenne area.

Following the above population and housing forecasts and anticipated roadway improvement changes, trip generation procedures were used as described in Section 2.5.1.1.1, Travel Demand, to produce baseline traffic conditions for the Cheyenne area.

For the communities of Wheatland, Chugwater, Torrington, Gering, Kimball, Pine Bluffs and Scottsbluff, and other population centers within the study transportation network, historic traffic growth in each area was reviewed. The major planned roadway improvements were discussed with community and state officials. Based on a review of previous traffic trends, probable roadway improvements, and discussions with the Wyoming and Nebraska state officials, the roads in the population centers in Wyoming were assigned an average annual traffic growth rate of 2 percent. Similarly, the roads in the population centers in Nebraska were assigned an annual growth rate of 2.5 percent. These growth rates were used to estimate baseline traffic conditions for the peak construction period and the operational phase beginning in 1990.

3.1.1.1.1.2 Proposed Action

Project-related and induced manpower estimates (Tables 1.1-1 and 1.1-2) formed the basis for determining housing needs and were used in estimating travel demand. Based on manpower needs, estimates were made of housing unit requirements for the peak construction year and for project operating conditions following construction (see Appendix A).

These housing units were allocated to various parts of the area where growth could logically occur. The housing data were then aggregated into traffic zones using Bureau of Census tracts and block groupings.

Project-related travel patterns were evaluated on the basis of projected work locations, work schedules, and vehicle occupancies.

In order to determine travel patterns, assumptions were made for work hours and vehicle occupancies. For the purposes of this study, it was assumed that all project-related employees would make work trips during the same peak hours, and that vehicle occupancies would be similar to those currently noted.

Based on the above assumptions, the peak-hour project-related traffic demand was determined. The number of additional vehicle trips made, as a result of the project, was combined with baseline traffic volume projections to determine impacts of the project on the road system. Appendix A contains a complete description of this process.

3.1.1.1.2 Traffic Engineering

3.1.1.1.2.1 Baseline Future - No Action Alternative

The methodology for describing existing conditions was extended in order to predict future conditions in the region without the construction of the project.

Projected volumes from the travel demand model for the Cheyenne area, described in Section 3.1.1.1.1, were used for future baseline year traffic volumes in the analysis. Capacity analyses were performed for applicable roadways, the Interstate system, major interchanges, and intersections for baseline conditions. Facilities that would experience a serious reduction in capacity to below level of service (LOS) "C" were identified, along with those already operating at LOS "D" or lower which would also be impacted. Similar analyses were conducted for queuing, delay, and safety, utilizing the same travel demand model information.

3.1.1.1.2.2 Proposed Action

The method for predicting impacts of the project on capacity, queuing, delay, and safety was to extend the methodology for describing existing baseline conditions in the region.

The combined peak-hour project-related traffic volumes and the baseline traffic volume projections for the Cheyenne area were used to perform the capacity analyses for the Interstate system and major interchanges and intersections. Queuing, delay, and safety analyses were also performed for the road system.

The combined traffic volumes for Wheatland, Chugwater, Torrington, Gering, Kimball, and Scottsbluff, and other population centers were utilized to conduct the traffic analyses at major intersections and roadway segments.

3.1.1.1.3 Physical Conditions

3.1.1.1.3.1 Baseline Future - No Action Alternative

The methodology for describing existing conditions was extended in order to predict future conditions in the region without the project. It was assumed that Minuteman transporter/erector (T/E) routes would continue to be used, and their physical condition would remain essentially unchanged with the current level of maintenance.

3.1.1.1.3.2 Proposed Action

The method for predicting impacts was to study the future roadway conditions with the projected volumes and requirements of the vehicles that would be using the roadways as part of the project. The roadways were also studied to determine the effects of a large and continuous number of construction vehicles.

Roadways were analyzed for their ability to meet engineering criteria, including horizontal and vertical alignment, intersection turning radius, roadway widths, and weights of the construction vehicles as well as other project-related vehicles.

Since physical conditions have been analyzed only for the T/E routes (of which only a small proportion fall within population centers) separate analytic methods were not developed for use in population centers. The methods used were the same as those for rural areas which are described in Section 3.1.1.2.3.2.

3.1.1.2 Rural Areas

3.1.1.2.1 Travel Demand

3.1.1.2.1.1 Baseline Future - No Action Alternative

The roadway network in rural areas interconnecting the communities consists of the Interstate system, state highways, and county roads.

Historic traffic growth within the rural areas was reviewed and probable roadway improvements were discussed with the State officials. The states normally project traffic volumes on various highway facilities to a design year 20 years hence. Based on a review of previous traffic trends, planned roadway improvements, the 20-year traffic projections, and discussions with Wyoming and Nebraska State officials, the following average annual traffic growth rates were selected:

Wyoming

Rural Interstate	-	4.0% average annual traffic growth rate
Rural State Highways	-	2.5% " " " " "
County Roads	-	1.0% " " " " "

Nebraska

Rural Interstate	-	3.0% average annual traffic growth rate
Rural State Highway	-	2.5% " " " " "
County Roads	-	1.0% " " " " "

These growth rates were used to estimate baseline traffic conditions.

The peak year of project-related construction varies in the rural areas. These peak years of construction determined the baseline time periods for which traffic forecasts were made for both the No Action and Proposed Action alternatives. A preliminary schedule calls for Flights to be worked in the following order: P, Q, T, R, S, A, B, C, D, and E. The first 20 LFs to be modified will be in Flights P, Q, T, and R in early 1986. All modifications are to be completed during 1989. Based on the estimation for Flight sequence and time schedules, construction activities for each county were determined for purposes of analysis only. These are summarized in Table 3.1.1-1.

3.1.1.2.1.2 Proposed Action

The number of additional vehicle trips made, as a result of the project, was combined with baseline traffic volume projections to determine impacts of the project on the road system.

Light vehicle traffic on selected roads is expected to increase in the range of 10 to 100 vehicles per day. The precise traffic number will depend upon the number of sites being modified along the same route during the same time period. Approximately half of this traffic is estimated to originate at F.E. Warren AFB. Based on this information, a decision was made to take a conservative approach and use the higher number of 100 vehicles per day on the selected routes.

Large-truck traffic is also estimated to increase in the range of 2 to 20 vehicles per day on selected routes. A small percentage of the heavy truck traffic is expected to originate at F.E. Warren AFB. Again, a conservative approach was taken and the higher number of 20 vehicles per day was used.

All four stages of the missile will be transported over public roads from F.E. Warren AFB to the selected LF. The frequency of missile movements, once the system is operational, is expected to be slightly higher than with Minuteman.

Truck traffic required for T/E road construction was also included in the analysis.

Table 3.1.1-1

ESTIMATED CONSTRUCTION ACTIVITY SEQUENCE BY COUNTIES

FLIGHTS	Number of Launch Facilities[1]				
	Laramie County	Platte County	Goshen County	Kimball County	Banner County
P	10				
Q	7	3			
T		10			
R		3	7		
S			10		
A	10				
B	2		3		5
C					10
D				8	2
E	4			6	
TOTAL:	33	16	20	14	17

Note: 1 Total number of Launch Facilities for the project is 100.

3.1.1.2.2 Traffic Engineering

3.1.1.2.2.1 Baseline Future - No Action Alternative

Estimated traffic volumes for future baseline years for the roadway network in rural areas were used to conduct the traffic analyses for the Interstate system, state highways, and county roads.

3.1.1.2.2.2 Proposed Action

The combined peak-hour project-related traffic volumes and the baseline traffic volume projections for the roadway network in rural areas were utilized to perform the traffic analyses for the Interstate system, state highways, and county roads.

3.1.1.2.3 Physical Conditions

3.1.1.2.3.1 Baseline Future - No Action Alternative

The methodology for describing existing conditions was extended in order to predict future conditions in the region without the project.

3.1.1.2.3.2 Proposed Action

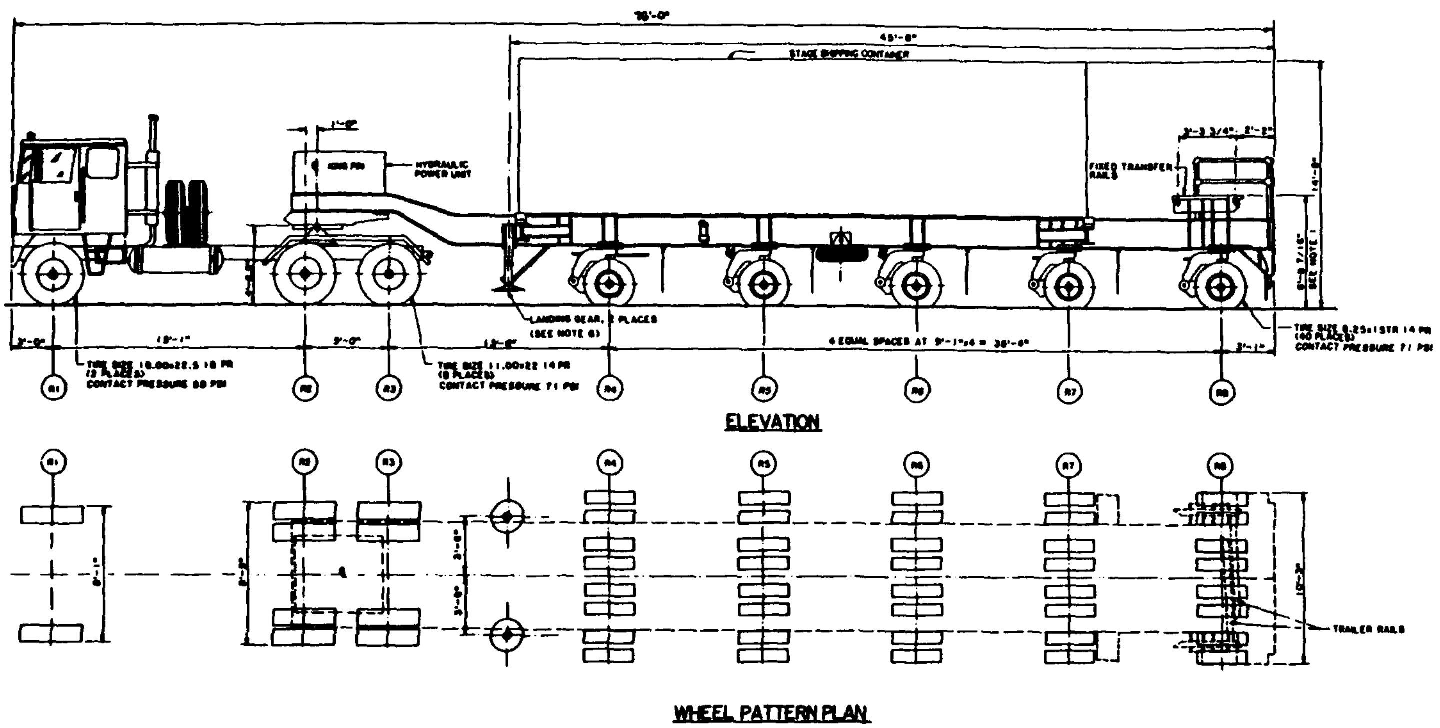
The analytic method used to assess the environmental consequences of the Proposed Action on physical road conditions in rural areas consisted initially of comparing the information gathered during the inventory of T/E routes with the various design standards relating to the stage transporter (S/T) vehicle.

The S/T vehicle, loaded with Stage I, was used as the design vehicle for purposes of this analysis. The vehicle weighs approximately 220,000 pounds loaded, with axle loadings of 30,000 pounds. The S/T vehicle is shown in Figure 3.1.1-1.

The S/T vehicle is approximately 12 feet longer, 2 feet wider, and 1 foot, 2 inches higher than the Minuteman T/E. The Minuteman T/E vehicle is shown in Figure 3.1.1-2. Although the S/T is approximately 100,000 pounds heavier than the loaded T/E when carrying Stage I, its single wheel load is about 1,000 pounds less than the T/E wheel load because there are 8 wheels per axle on the S/T versus 4 wheels per axle on the T/E.

The 3 T/E trailer axles are spaced approximately 67 inches apart with a total group span of 11 feet, 2 inches. The total group load is about 54,000 pounds. The total maximum load on any two S/T trailer axles is about 56,000 pounds, which is approximately 2,000 pounds or 3.6 percent heavier than the T/E axle group load. The S/T can negotiate a tighter turn than the T/E.

Preliminary roadway and bridge standards used for this analysis for the S/T specifically refer to roadway width, shoulder width, pavement structure, curve radii, superelevation, cross slope, longitudinal grades, vertical clearance, and cover for culverts. A basic assumption in the analysis is that the T/E routes will be upgraded to meet the vehicle standards of the project. A further assumption is that the existing conditions of other public roadways that may be impacted by project-related construction activities will be ade-



LOAD DESCRIPTION	AXLE LOADS (LB) *		
	R1	R2-R3	R4-R8
STAGE I	21,000	24,000	30,000
STAGE II	20,000	17,000	23,000
STAGE III	20,000	15,000	15,000

* LOADS INCLUDE STAGES, END RINGS AND TYPE II SEMITRAILER

NOTE:

1. 6'-6 7/16" IS THE HIGHWAY - RUNNING HEIGHT. THE ROLL TRANSFER HEIGHT BEING 6'-7 7/16"
2. STEERABLE AXLES R1, R4, R7 & R8 FIXED AXLES R2, R3, R5 & R6
3. MAXIMUM ANTICIPATED TIRE PRESSURE 100 PSI
4. RAMP CAPABILITY: 6% RAMP WITH 3.5-FT RISE, OR 10% RAMP WITH 11-IN. RISE
5. GRADE CAPABILITY: 7.5% AT 8.8 MPH 5.67% AT 10 MPH
6. EACH LANDING GEAR BEARING SURFACE IS 20.5" IN DIAMETER WITH A MAXIMUM BEARING PRESSURE OF 100 PSI

NOT TO SCALE

FIGURE 3.1.1-1 TYPE II STAGE TRANSPORTER

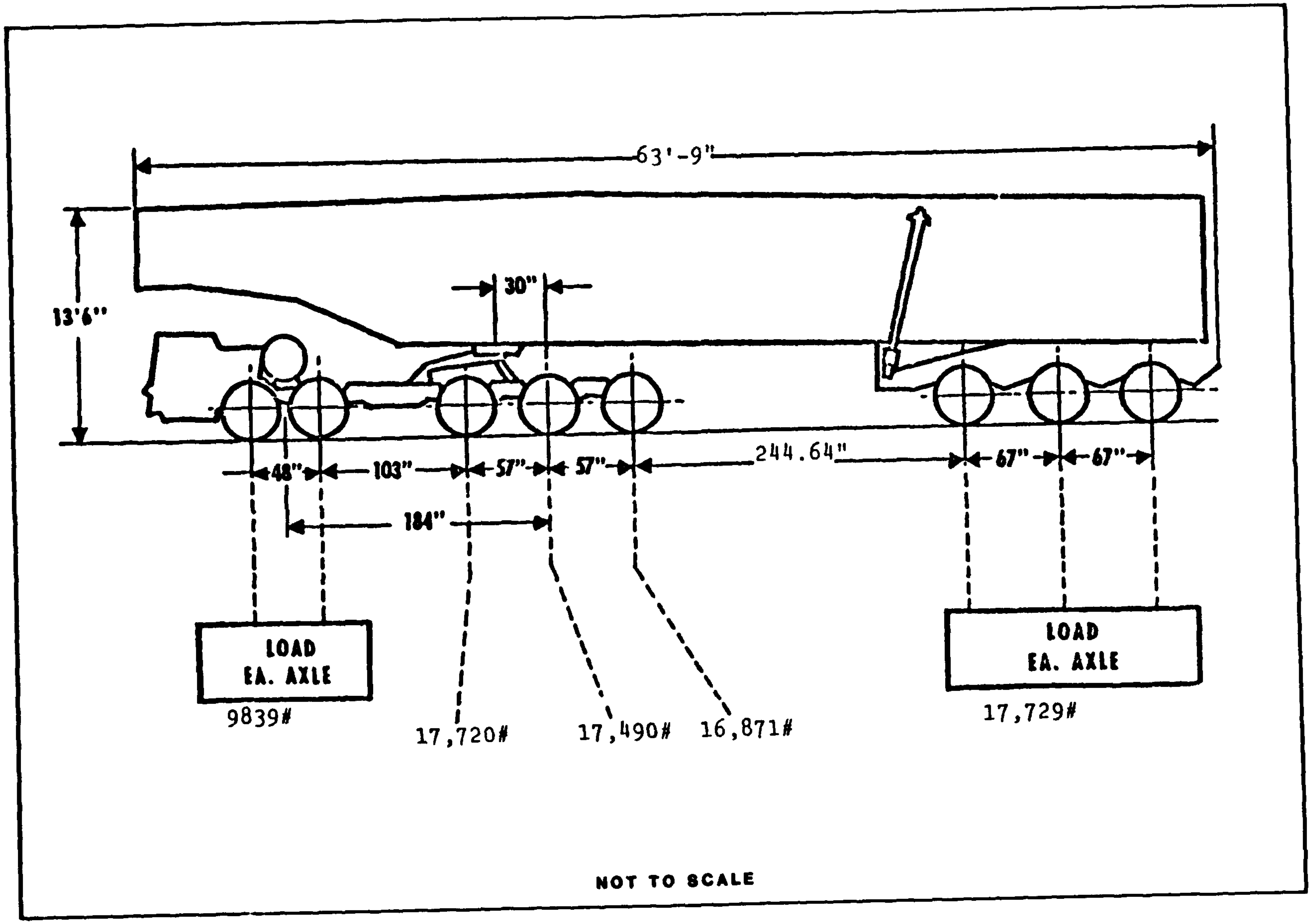


FIGURE 3.1.1-2 MINUTEMAN III TRANSPORTER/ERECTOR

quately maintained. Examples of culvert standards are shown in Table 3.1.1-2 and bridge standards are shown in Table 3.1.1-3.

Table 3.1.1-2

STANDARDS FOR CULVERTS

Culvert Type	Minimum Cover
Reinforced Concrete Pipe	
Diameter 12 to 42 in.	2 ft
Diameter greater than 42 in	Diameter/1.75
Corrugated Metal Pipe	
Diameter to 120 in	Diameter/1.75, (21 in. min)
Diameter over 120 in	Diameter/3
Corrugated Metal Pipe Arch	Span/3, (21 in min)
Reinforced Concrete Arch Culverts	
Spans to 14 ft	Span/2.5 (4 ft min)
Spans 15 to 22 ft	Span/3.5 (6 ft min)

Table 3.1.1-3

PROJECT BRIDGE CRITERIA

Bridge Capacity	Maximum Span Allowable
H10	9 ft
H12	12 ft
H15	35 ft
H20	40 ft
HS20	80 ft

Note: The bridge criteria include the following restrictions:

1) No other vehicles are permitted on the structure while the loaded S/T is traversing the bridge.

2) The S/T will traverse the centerline of the bridge.

During the inventory, road surface type was recorded in terms of the Wyoming State Classification system. It was determined that surface classes C (graded and drained earth roads), D (soil surface roads), and E-1 (gravel roads not graded or drained) did not meet the preliminary route standards of this project.

A computerized procedure was used to compare the inventory data with the above standards and prepare a summary of inadequate physical conditions. For example, many of the gravel and earth roads inventoried had a homogeneous section with no distinction between roadway and shoulders. Total widths (roadway plus both shoulders) were therefore compared with design standards.

The project bridge criteria presented in Table 3.1.1-3 and the methods by which they were derived were reviewed for this preliminary analysis. A more detailed analysis of individual bridges will be required to determine if they are structurally adequate to carry the loaded S/T. Such analyses would distinguish between simple and continuous spans; inventory and operating loading conditions; and would take into consideration wheel distribution and impact factors. While the majority of bridges carrying T/E routes can be analyzed using information available from existing state inspection reports, additional inspections may be necessary in a number of cases. The culvert design standards should also be reviewed, based on the axle and wheel loadings of the S/T vehicle.

It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation process by the Military Traffic Management Command (MTMC), the Federal Highway Administration (FHWA), the Department of the Air Force, and the state and local transportation departments.

In addition to the T/E routes, consideration must be given to other rural county routes that may experience project-related traffic increases. The AASHTO Geometric Design Guide for local roads and streets provides the engineering standards for these roadways.

3.1.2 Railroads

3.1.2.1 Baseline Future - No Action Alternative

A formal traffic forecast is difficult to prepare due to lack of information from the railroads and limited information available from public agencies.

Projected future traffic growth was determined through discussions with railroad officials.

3.1.2.2 Proposed Action

The railroad impact assessment is based on an analysis of the project-related rail traffic demand which would be added to the baseline railroad traffic. A determination of the types of cargo best suited for transportation by rail was made and allocated to those railroad lines which serve project sites.

3.1.3 Aviation

3.1.3.1 Baseline Future - No Action Alternative

Estimates of future travel demand for passengers using commercial airline services considered the following facts:

- Regional and national trends;

- Statewide forecasts (most state aviation plans are outdated due to recent events, e.g., the air controllers' strike, increased fuel prices, etc.), the Federal Aviation Administration (FAA) Terminal Forecasts, and discussion with airport officials;
- Growth in personal income;
- Remoteness of the area served by the airport; and
- Competitive nature of the market, as noted in the fare structures.

General aviation forecasts also depend on the factors listed above, although the importance of any one factor would vary.

Based upon the projected aircraft mix and load factors, aircraft operations were estimated.

The possible construction of a heliport at Memorial Hospital in Cheyenne is an issue which can only be addressed qualitatively.

3.1.3.2 Proposed Action

Project-related traffic operations were added to baseline conditions to determine the impact of the project on the area airports and the regional air traffic system. The total traffic resulting from the project was compared with existing and planned capacity. Special requirements, such as longer runways, heavier loads, etc., were also considered.

3.1.4 Public Transit

3.1.4.1 Baseline Future - No Action Alternative

Project-related transit demand is based on projected population and housing demands. Analysis included the ability of the transit system to serve the demands of the added population.

3.1.4.2 Proposed Action

The methodology employed for developing the profile of future trends is the same as that used for the No Action alternative.

3.1.5 Pedestrian and Bicycle Facilities

3.1.5.1 Baseline Future - No Action Alternative

The same methodology which was employed in developing a profile of existing conditions was used based on proposed facilities to be added during the baseline years.

Increases in pedestrian and bicycle trips were based on analysis of proposed facility additions.

3.1.5.2 Proposed Action

Additional pedestrian and bicycle trips were determined as a result of an analysis of additional project-related public facilities (schools, hospitals, parks, etc.). Analysis was done on the access, LOS, and safety of the various pedestrian and bicycle facilities and their interrelationships with vehicular traffic.

3.2 Assumptions and Assumed Mitigations

3.2.1 Assumptions

Basic assumptions used in the roadway analysis include the following:

- The transporter/erector route will be upgraded to meet the vehicle standards of the project;
- The existing conditions of other public roadways that are impacted by project-related construction vehicles will be adequately maintained during the construction phase; and
- Necessary roadway changes concerning the F.E. Warren AFB roadway Alternatives R1, R2, and R3 will be made to meet the vehicle standards of the project.

3.2.2 Assumed Mitigations

No special mitigations were assumed for the purpose of impact analysis.

3.3 Level of Impact Definitions

The basic objective of a transportation facility is to accommodate a quantity of traffic demand with an acceptable quality of service. Additional project-related traffic demand would have an impact on the quality of transportation service. Levels of impact are defined below for each of the transportation elements.

3.3.1 Roads

For roads, the levels of impacts are measured primarily by changes in the traffic level of service and the physical condition of the roadway system. Also considered are the amount of delay, length of queues, and vehicular safety. Criteria for urban and rural systems are provided where appropriate.

3.3.1.1 Level of Service

The measure of quality of service is a function of the ratio of the rate of flow to the capacity of the transportation facility. The LOS concept defines this function and generally describes the operating conditions a driver may experience while traveling on a particular roadway. LOS on a particular roadway varies primarily with volume. Table 3.3.1-1 shows a range from level A (best) to level F (worst).

Table 3.3.1-1

LEVEL OF SERVICE

A	Free flow with low volumes and high speeds.
B	Stable flow with operating speeds beginning to be restricted somewhat by traffic conditions.
C	Stable flow, but speeds and maneuverability are more closely controlled by high volumes.
D	Approaches unstable flow with tolerable operating speeds being maintained though considerably affected by changes in operating conditions.
E	Unstable flow with speeds lower than in level D and volumes at or near maximum possible capacity. Possible stoppages of momentary duration.
F	Forced flow with low speeds and volume below maximum capacity resulting from queues of vehicles backing up from a restriction downstream. Possible stoppages for short or long periods of time.

Source: 1965 Highway Capacity Manual.

Levels of impact for LOS are characterized as follows:

- o Negligible Impact - Will result in no change in LOS for categories A, B, or C. Although actual traffic volumes may increase, the motorist would perceive no difference in traffic operations.
- o Low Impact - Will result in LOS category changes from A to B, or B to C; but no changes in LOS categories D, E, or F. The motorist might perceive a slight change in traffic.
- o Moderate Impact - Will result in LOS category changes from A to C, C to D, D to E, or E to F. The motorist would perceive a noticeable decrease in the quality of service in traffic operations.
- o High Impact - Will result in LOS category changes from A to D, A to E, and A to F, B to D, B to E, B to F, C to E, C to F, and D to F. The motorist would perceive a drastic decrease in quality of service in traffic operations.

3.3.1.2 <u>Physical Conditions</u>

The levels of impact for physical conditions are as follows:

- o Negligible Impact - Will result in no change in existing roadway conditions.

- Low Impact - Will result in minimum change in existing roadway conditions involving minor deterioration, which would be corrected during routine maintenance. Motorists might perceive a slight decrease in roadway conditions.

- Moderate Impact - Will result in noticeable change in existing roadway conditions requiring site-specific repairs or maintenance due to deterioration.

- High Impact - Will result in a severe change in existing roadway conditions, requiring extensive reconstruction or a substantial increase in the overall maintenance cycle.

3.3.1.3 Queues

The levels of impact for queues are as follows:

- Negligible Impact - Will result in no change from projected baseline length of queues.

- Low Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections within one cycle length (a complete change in signal indications from red to green to yellow to red).

- Moderate Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections within two cycle lengths.

- High Impact - Will result in an increase from projected baseline length of queues. Vehicles will pass through signalized intersections in two or more cycle lengths.

In a rural situation, queues are a function of the speed of traffic (covered by delays) and are not based on signalized intersections as in an urban setting.

3.3.1.4 Delay (Urban)

The levels of impact for delay are as follows:

- Negligible Impact - Will result in no increase in delay or total travel time from projected baseline.

- Low Impact - Will result in an increase in delay from projected baseline. Motorists will begin to reduce the acceptable space or gap between cross traffic for entering a stream flow of traffic.

- Moderate Impact - Will result in an increase in delay from projected baseline. Motorists will begin to reduce their gap acceptance and occasionally use alternate travel routes.

- High Impact - Will result in an increase in delay from projected baseline. Motorists will find and use alternate travel routes.

3.3.1.5 Delay (Rural)

In a rural situation, the levels of impact for delay are as follows:

- o Negligible Impact - Will result in no increase in delay or total travel time from projected baseline.
- o Low Impact - Will result in an increase in delay from projected baseline. Queues of vehicles will begin to form at speeds of the slowest vehicle in the stream.
- o Moderate Impact - Will result in an increase in delay from projected baseline. Queues of vehicles will begin to form and in some cases might result in the halting of traffic and use of alternative routes.
- o High Impact - Will result in an increase in delay from projected baseline. Motorists will be required to halt frequently, and where possible, take alternative routes.

Delays are taken as a function of flow rates (both ways), speed of travel, speed variance, and passing sight distance.

3.3.1.6 Safety

The levels of impact for safety are as follows:

- o Negligible Impact - Will result in no change from projected baseline accidents.
- o Low Impact - Will result in a change from projected baseline accidents, involving minimal property damage (less than $200), no injuries, and no loss of life.
- o Moderate Impact - Will result in a change from projected baseline accidents involving property damage over $200, minor injuries, and no loss of life.
- o High Impact - Will result in a change from projected baseline accidents, involving property damage over $200, major injuries, and/or loss of life.

The Manual on Uniform Traffic Control Devices (FHWA 1978) recognizes an accident with property damage in the amount of at least $100 important enough to be considered in the design warrants for traffic signal systems. However, the motor vehicle registries in various states require an accident with property damage of $200 or more to be reported in writing by the vehicle owners. Therefore, this monetary amount formed the basis for assessing damage.

3.3.2 Railroads

For railroads, the levels of impact are measured by changes in various aspects of transportation, such as frequency of service, number and capacity of trains, holding facilities and rail yards, and system of operations. The levels of impact for railroads are as follows:

- Negligible Impact - Change in projected baseline that will result in no increase in regular services and volumes.

- Low Impact - Change in projected baseline that will require no additional manpower to handle additional freight with present schedules and physical facilities.

- Moderate Impact - Change in projected baseline that will require additional manpower and modifications to system of operations to handle additional freight.

- High Impact - Change in projected baseline that will require additional manpower and the use of all present capacity of holding facilities, rail yards, and other physical facilities to handle additional freight. Enlargement or relocation of facilities will be necessary.

3.3.3 Aviation

For airports, the level of impact is measured by changes in air operations, safety, and land-side facilities. The levels of impact for aviation are as follows:

- Negligible Impact - Change in projected baseline that will cause no increases in airport operations or land-side volumes.

- Low Impact - Change in projected baseline that will permit increased air operations to remain within limits of safety regulations and not appreciably change demand for land-side facilities.

- Moderate Impact - Change in projected baseline that will require appreciable enlargement of airport land-side facilities, but air traffic operations will remain within safety limits.

- High Impact - Change in projected baseline that will approach limits of air traffic operations safety, requiring changes in projected baseline operation procedures. Land-side facilities will approach capacity for any expansion at the present airport site.

3.3.4 Public Transit

For local commuter bus transportation, quality of service is measured by scheduling, passenger comfort, and ease of travel. At some point, bus capacity can be exceeded and additional buses should be placed in service. Additional buses could offer a higher level of passenger comfort, but might have a slight adverse effect on overall traffic flow. The levels of impact for public transit are as follows:

- o Negligible Impact - Change in projected baseline that will cause an increase in the number of passengers, but require no schedule modifications.

- o Low Impact - Change in projected baseline. All passengers will be seated but modifications to schedules will be required due to increased passengers.

- o Moderate Impact - Change in projected baseline. There will be standees at peak hours and schedule changes will be necessary.

- o High Impact - Change in projected baseline. Standees approach bus capacity and additional vehicles must be acquired.

For taxis, the level of impact is measured by response, travel time, and size of fleet. The levels of impact for taxis are as follows:

- o Negligible Impact - Change in projected baseline that will cause no increase in response time or travel time.

- o Low Impact - Change in projected baseline that will cause minor increases in response time and travel times.

- o Moderate Impact - Change in projected baseline that will cause noticeable increases in response and travel times; vehicles may be added to the fleet.

- o High Impact - Change in projected baseline that will increase response time beyond reasonable customer acceptable levels; vehicles will be added to the fleet.

3.3.5 Pedestrian and Bicycle Facilities

For pedestrians and bicyclists, the level of impact is measured by the safety of the pedestrian or bicyclist, as defined in Section 3.3.1.6.

3.4 Significance Determination

Once the level of impact is identified, the significance of the impact can be determined.

Significance is a measure of the importance of an impact. It is a function of the interaction between level of impact and the context in which the impact occurs. Context represents the various qualitative conditions present in the existing environment which operate to magnify or diminish the importance of the impact. If one or more of the following conditions is present, the impact will be considered significant: whether the impact affects public safety, whether the impact is likely to be highly controversial, whether the action and its impact are related to other actions with individually insignificant but cumulatively significant impacts, and whether institutional responses to the impact will be extensive.

A more detailed rationale for determination of significance for each of the transportation criteria is presented here. As can be seen, they address the public safety and institutional conditions cited above.

3.4.1 Roads

An impact will be considered significant if one or more of the following conditions are present:

- o Level of service - A reduction in LOS will occur for more than 1 hour (an accepted criteria for analysis and design of roadway facilities) or the LOS will be reduced below minimum desirable design standards, generally accpeted to be level C.
- o Physical Condition - A decrease in existing roadway conditions will occur over an extended period requiring substantial physical improvements or substantially increased maintenance.
- o Queues - An increase in length of queues will occur for more than 1 hour (an accepted criteria for analysis and design of roadway facilities) or will begin to extend to adjacent intersections.
- o Delay - An increase in delay of more than 5 minutes (an accepted criteria for analysis) will occur or alternate travel routes will become congested.
- o Safety - An increase in number of accidents per year will occur and necessitate change of traffic control device or substantial geometric improvements.

3.4.2 Railroads

An impact will be considered significant if it could result in increased railroad traffic for a continuously extended period of time which will require substantial modification to facilities or could begin to affect train traffic beyond the project area.

3.4.3 Aviation

An impact will be considered significant if it could result in increased operations over a continuously extended period of time which require substantial physical improvements or cause violations in air operations safety regulations.

3.4.4 Public Transit

An impact will be considered significant if it could result in an appreciable increase in the number of passengers over a continuously extended period of time which will require additional vehicles.

3.4.5 Pedestrian and Bicycle Facilities

An impact will be considered significant if it could result in an appreciable increase in accidents which will warrant physical or safety-related improvements.

3.5 Environmental Consequences of the Proposed Action and the No Action Alternative

3.5.1 Roads

3.5.1.1 Population Centers

3.5.1.1.1 Baseline Future - No Action Alternative

3.5.1.1.1.1 Laramie County, Wyoming

Consideration was given to the project-related transportation impact on other population centers of Laramie County. Based on available information, it became apparent that the rural road network associated with the LF modifications needed detailed study. With the exception of Cheyenne and Pine Bluffs, population and associated traffic increases for small population centers (including Burns, Albin, Carpenter, Egbert, and Hillsdale) were negligible and did not warrant detailed study.

Cheyenne. Average daily traffic (ADT) and design hourly volumes (DHV) for the study network for the year 1985 (without the project) are shown in Figures 3.5.1-1 and 3.5.1-2.

On Interstate 25, traffic volumes range from a minimum of 7,200 ADT north of Vandehei interchange to a maximum of 16,000 ADT on the segment between the Randall Avenue and Central Avenue interchanges. This maximum ADT segment is considered to be the critical freeway segment on Interstate 25 within the study network for capacity analysis purposes. LOS was calculated to be "B" for both northbound and southbound traffic. Weaving sections at the interchange of Interstate 25 and Randall Avenue were also analyzed and found to be LOS "A" in both directions.

On Interstate 80, traffic volumes ranged from a minimum of 5,200 ADT east of College Drive to a maximum of 7,000 ADT in the vicinity of the interchange with Interstate 25. The freeway segment between Interstate 25 and U.S. 85 was considered as the critical segment. The LOS was calculated to be "B" for both eastbound and westbound traffic.

ADT and DHV for the study network for the year 1990 (without the project) are shown in Figure 3.5.1-3 and 3.5.1-4. The traffic volumes and capacity analyses show trends similar to 1985 traffic volumes.

For principal arterials, minor arterials, and important collectors, capacity is considered to equal the most restricted intersection along the route. Therefore, capacity analyses and LOS for arterials and collectors for 1985 and 1990 (without the project) are controlled by intersections.

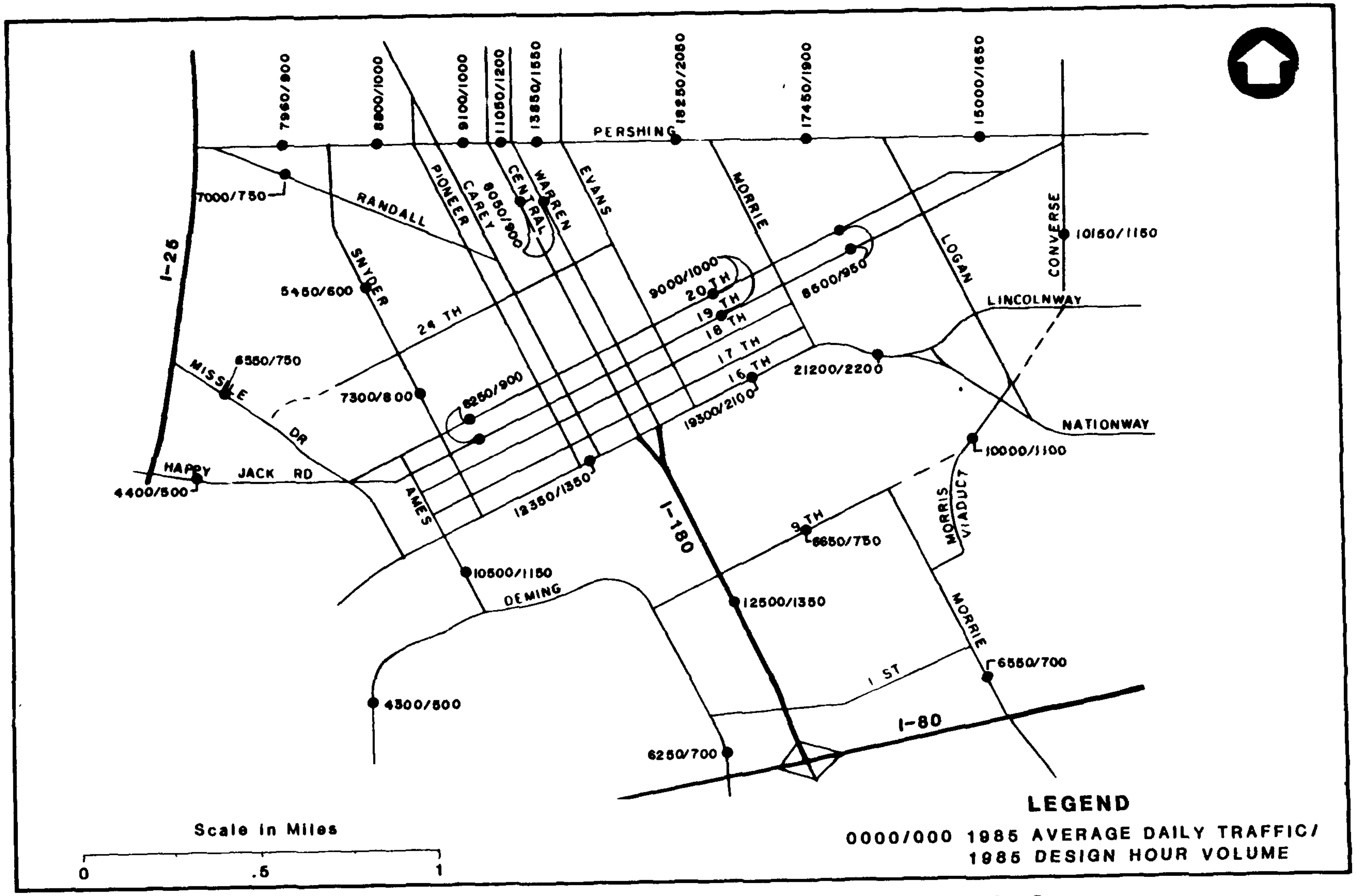


FIGURE 3.5.1-1 1985 ESTIMATED BASELINE TRAFFIC PROJECTIONS IN DOWNTOWN CHEYENNE

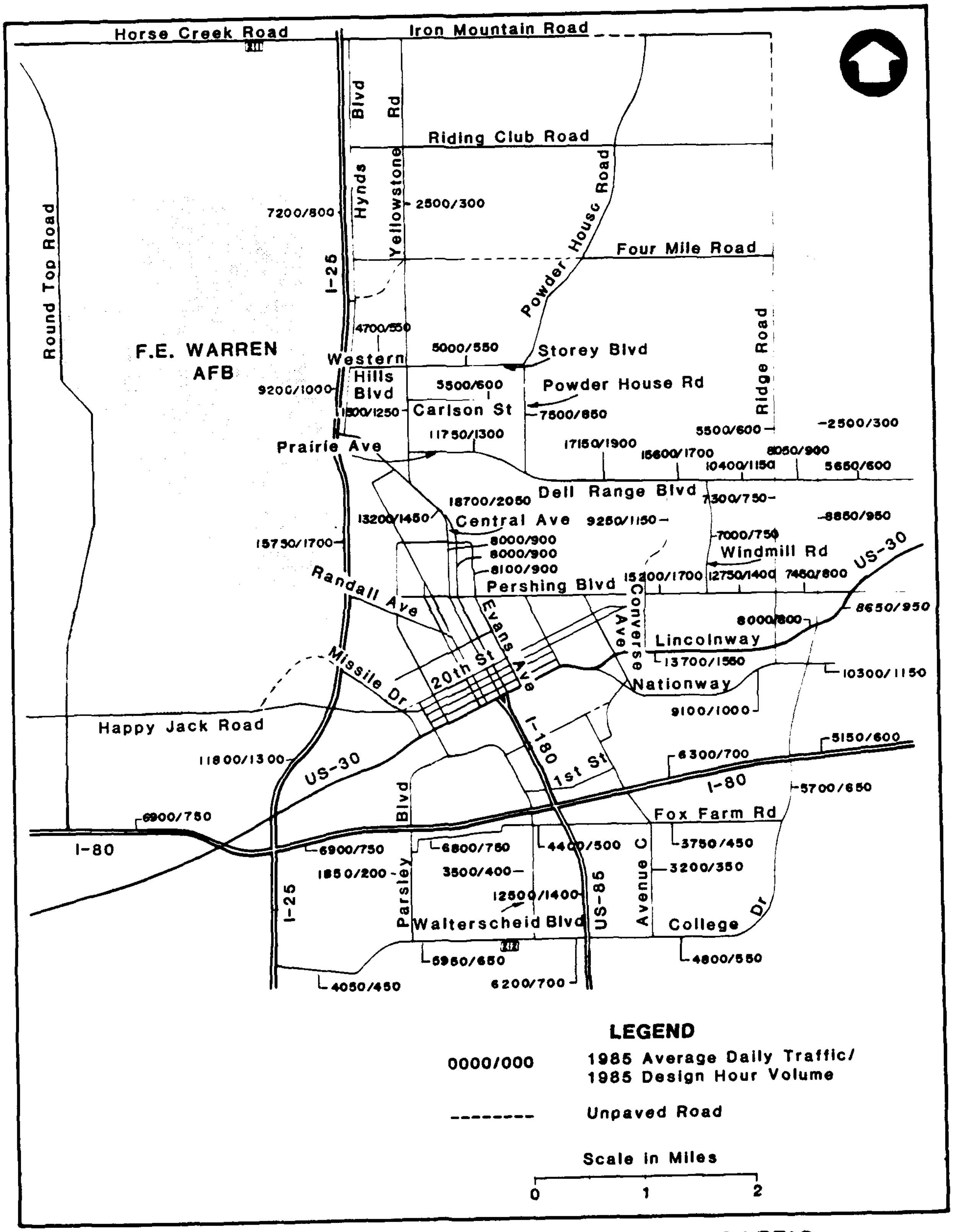


FIGURE 3.5.1-2 1985 ESTIMATED BASELINE TRAFFIC PROJECTIONS IN THE CHEYENNE AREA

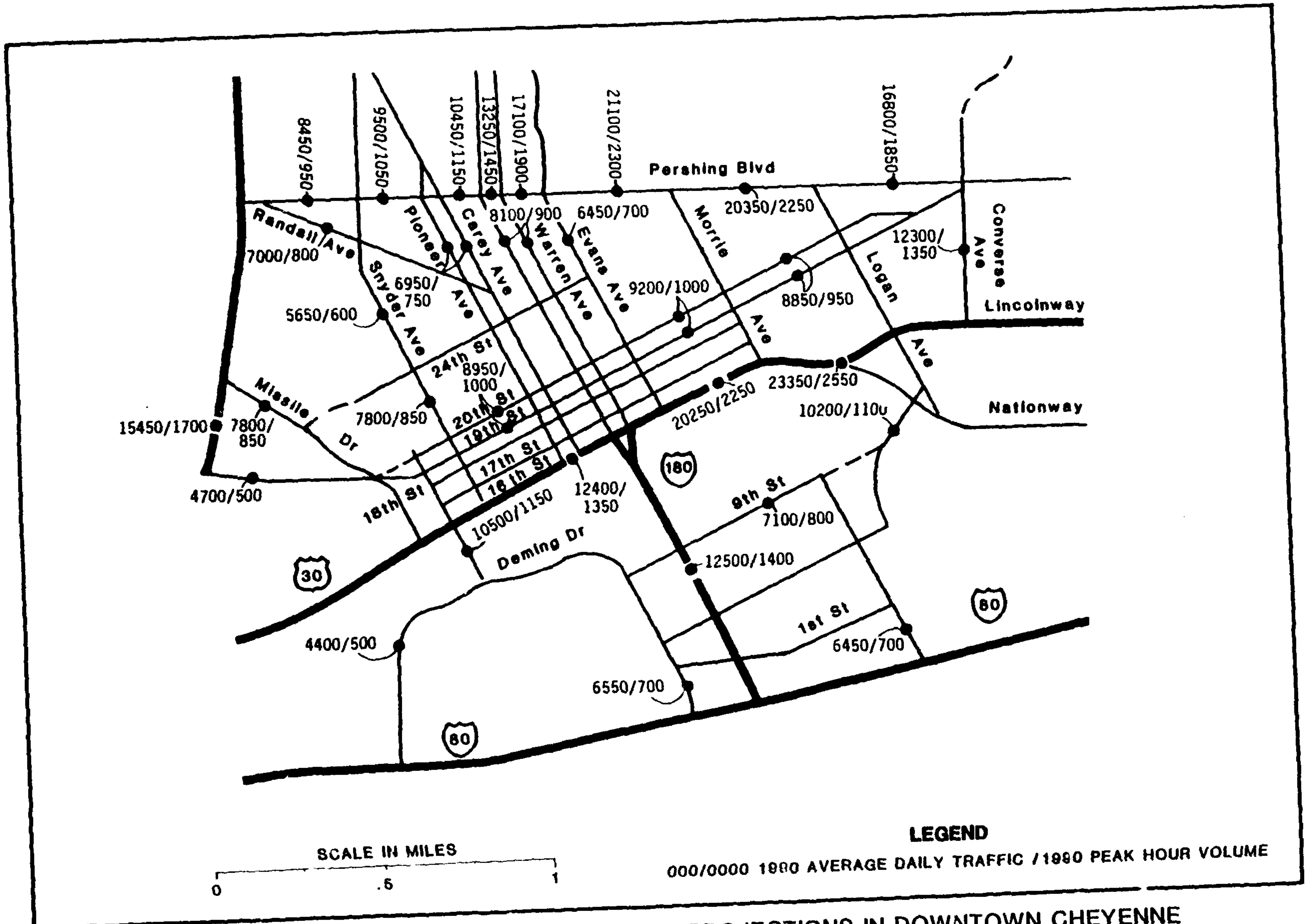


FIGURE 3.5.1-3 1990 ESTIMATED BASELINE TRAFFIC PROJECTIONS IN DOWNTOWN CHEYENNE

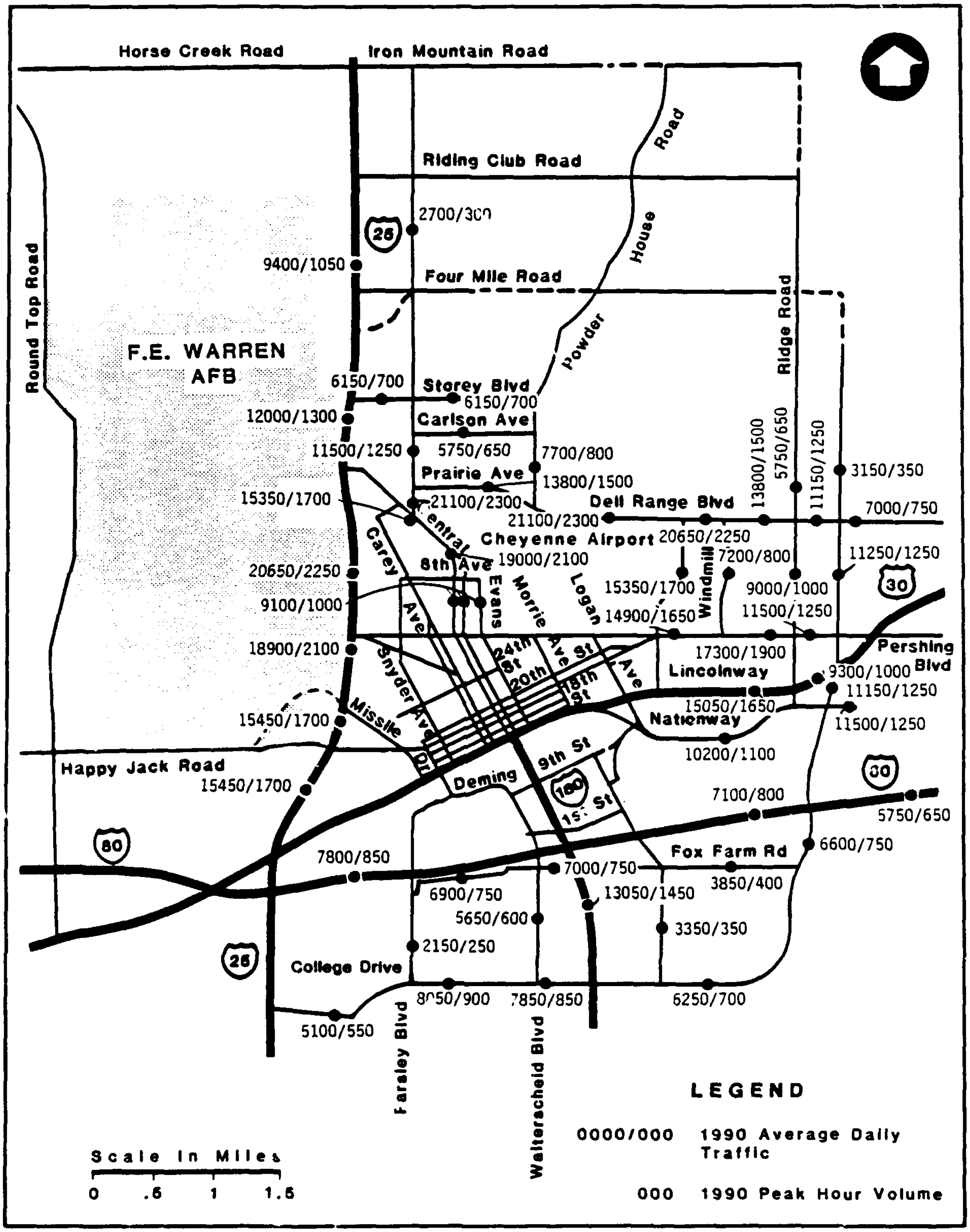


FIGURE 3.5.1-4 1990 BASELINE TRAFFIC PROJECTIONS IN THE CHEYENNE AREA

Analysis of the baseline Cheyenne road system indicates that traffic problems may arise, not so much from overall high traffic volumes but from deficiencies in the circulation system. The development of an adequate circulation system would spread traffic demand over a larger system, thus avoiding the concentration of traffic demand that leads to congestion.

Figure 3.5.1-5 identifies both corridors in the street network and intersections that necesessitate further study.

Specific corridors with baseline circulation problems include:

- Missile Drive to Deming Drive;
- Deming Drive - Ninth Street to Converse Avenue;
- Converse Avenue between Dell Range Boulevard and Pershing Boulevard;
- 16th Street/Lincolnway between Missile Drive and Converse Avenue;
- 19th Street and 20th Street between Missile Drive and Pershing Boulevard;
- Central Avenue - Yellowstone Road between Eighth Street and Prairie Avenue; and
- Evans Avenue between Pershing Boulevard and 16th Street.

In addition to the above, several intersections on Pershing Boulevard, Randall Avenue, and Dell Range Boulevard have baseline circulation problems.

3.5.1.1.1.2 Platte County, Wyoming

Consideration was given to the project-related transportation impact on population centers of Platte County. Based on available information, it became apparent that the countywide rural road network associated with the LF modifications needed detailed study. Population and associated traffic increases for Wheatland and Chugwater appeared to necessitate detailed study. Figures 3.5.1-6 to 3.5.1-9 show 1986 traffic volumes, with and without project, and 1990 baseline traffic volumes for Wheatland and Chugwater.

3.5.1.1.1.3 Goshen County, Wyoming

Consideration was given to the project-related transportation impact on population centers of Goshen County. Based on available information, it became apparent that the rural road network associated with the LF modifications needed detailed study. Population and associated traffic increases for small population centers, including Lingle, Fort Laramie, LaGrange, Yoder, Hawk Springs, Huntley, Fort Laramie National Monument, and Veteran were negligible and did not warrant detailed study. A study was made of project-related traffic in Torrington; Figures 3.5.1-10 and 3.5.1-11 show 1988 traffic volumes, with and without the project, and 1990 baseline traffic volumes for the town.

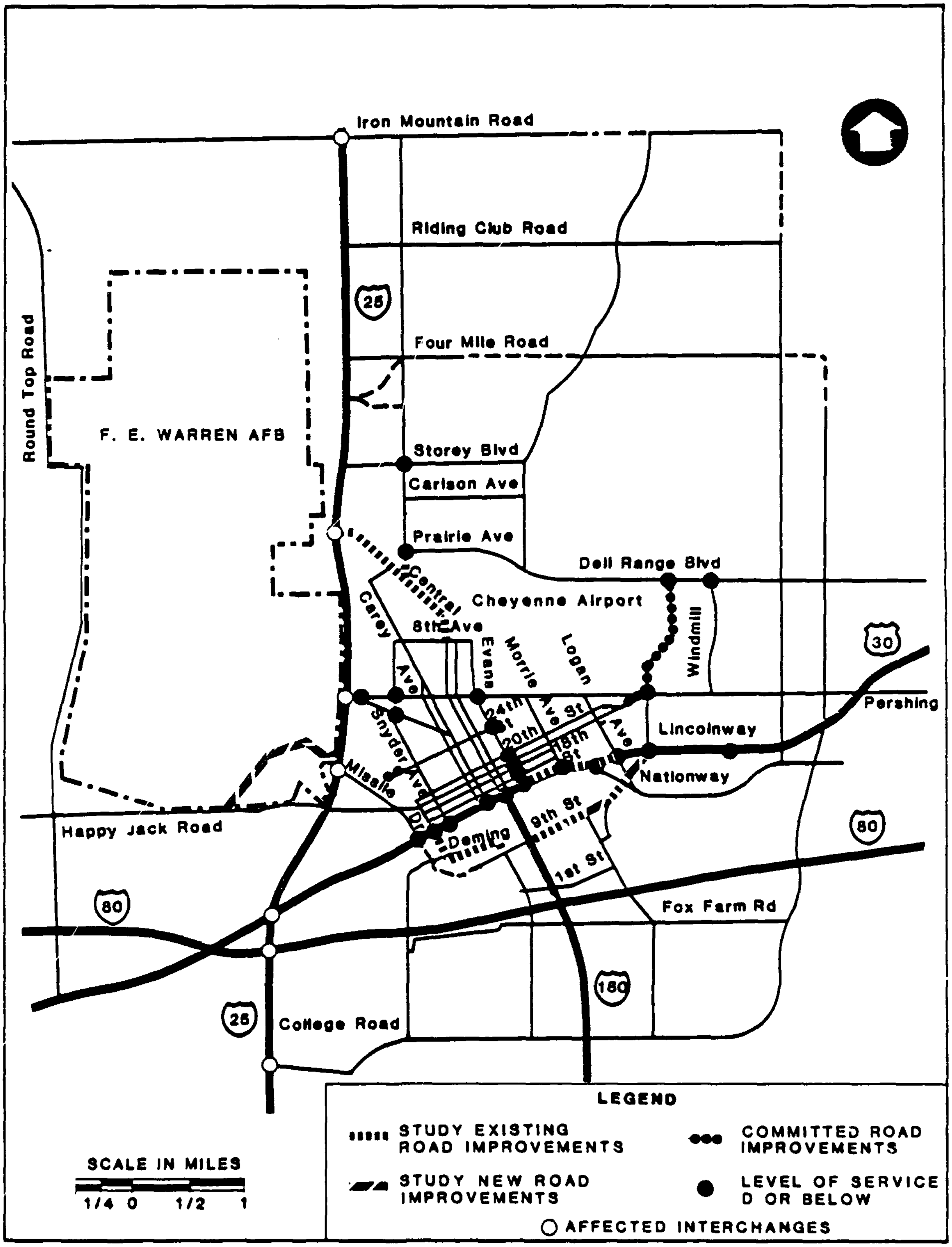


FIGURE 3.5.1-5 CHEYENNE TRAFFIC IMPROVEMENT STUDY AREA

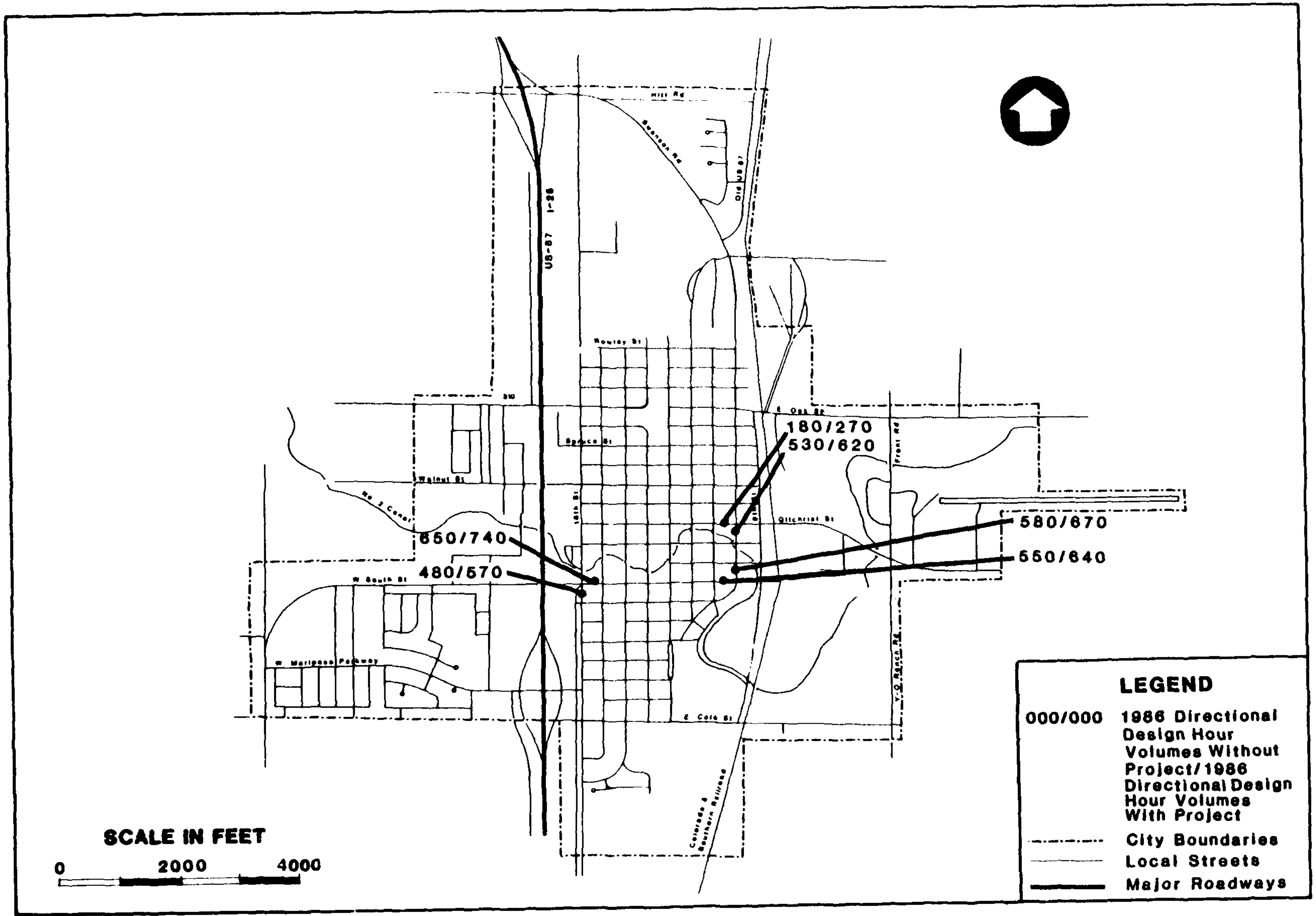


FIGURE 3.5.1-6 1986 ESTIMATED TRAFFIC VOLUMES WITH AND WITHOUT PROJECT IN TOWN OF WHEATLAND

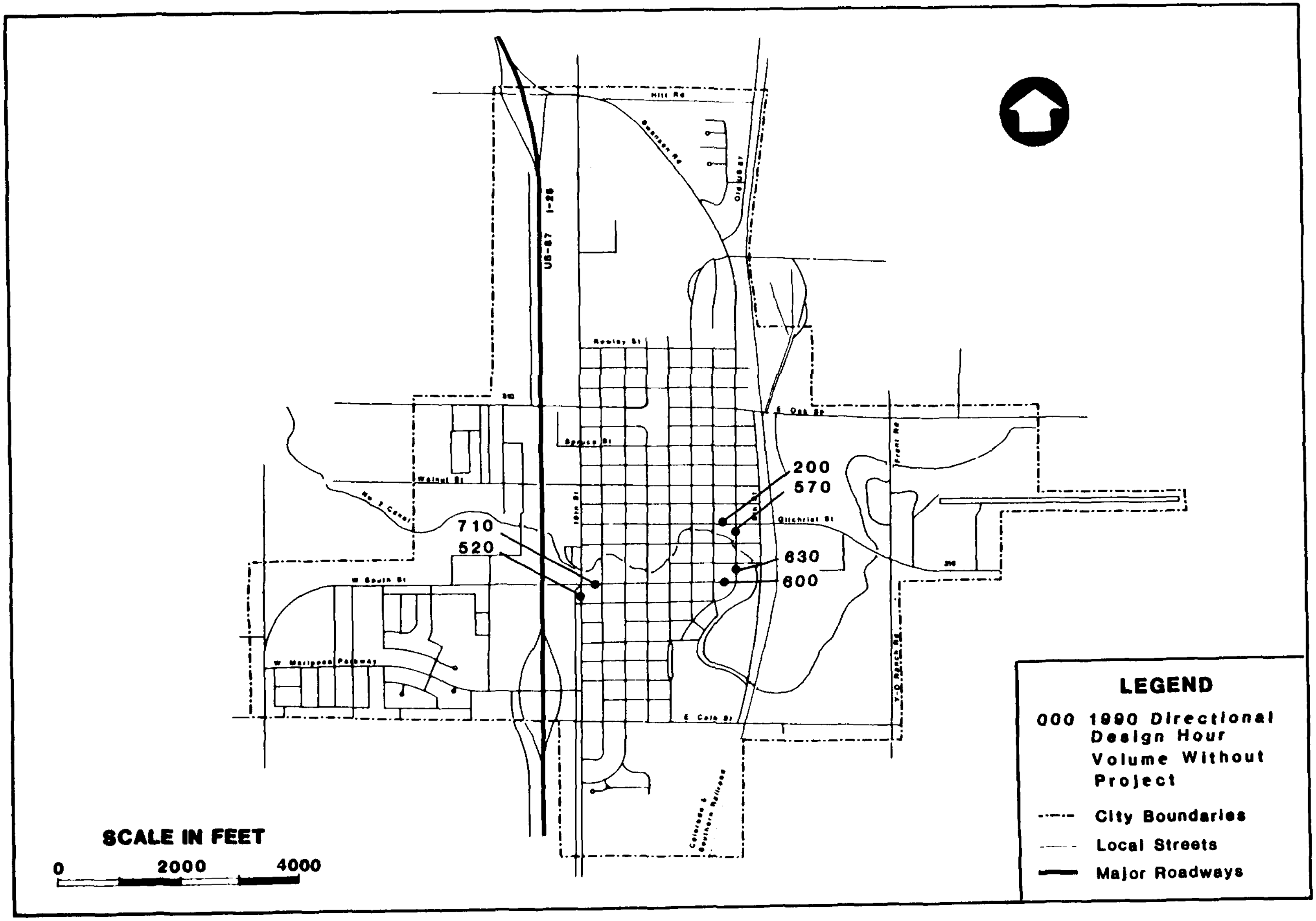


FIGURE 3.5.1-7 1990 ESTIMATED TRAFFIC VOLUMES WITHOUT PROJECT IN TOWN OF WHEATLAND

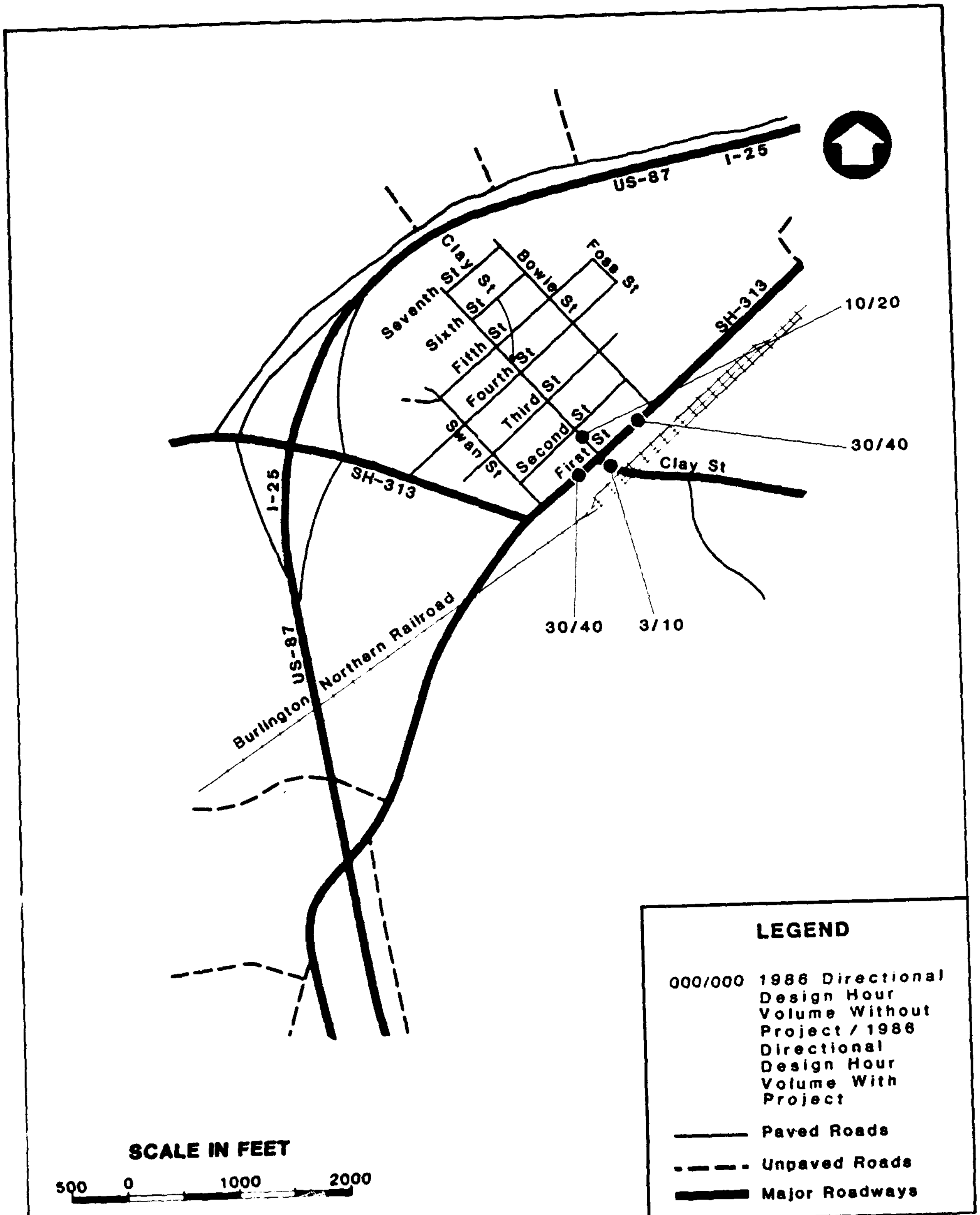


FIGURE 3.5.1-8 1986 ESTIMATED TRAFFIC VOLUMES WITH AND WITHOUT PROJECT IN TOWN OF CHUGWATER

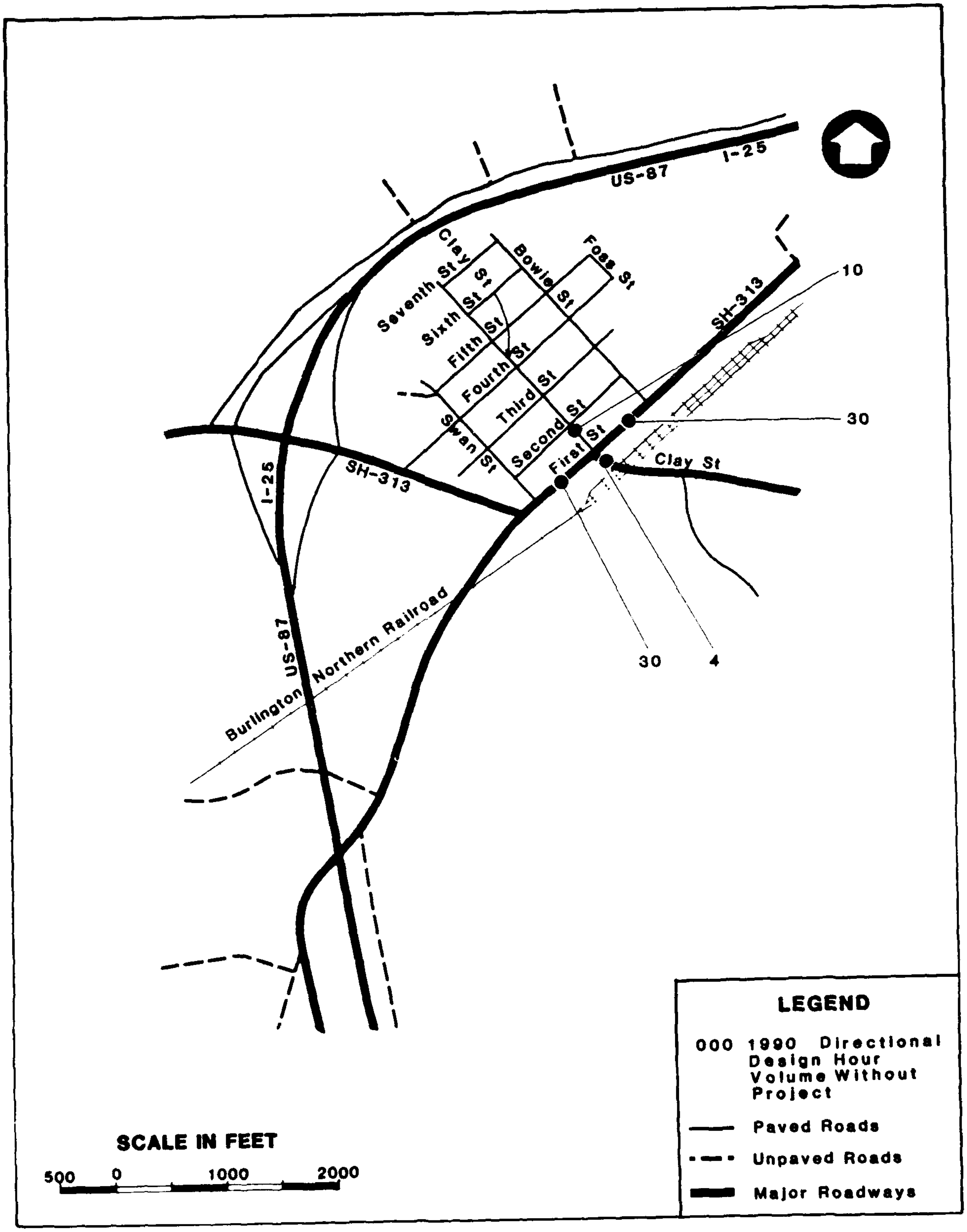


FIGURE 3.5.1-9 1990 ESTIMATED TRAFFIC VOLUMES WITHOUT PROJECT IN TOWN OF CHUGWATER

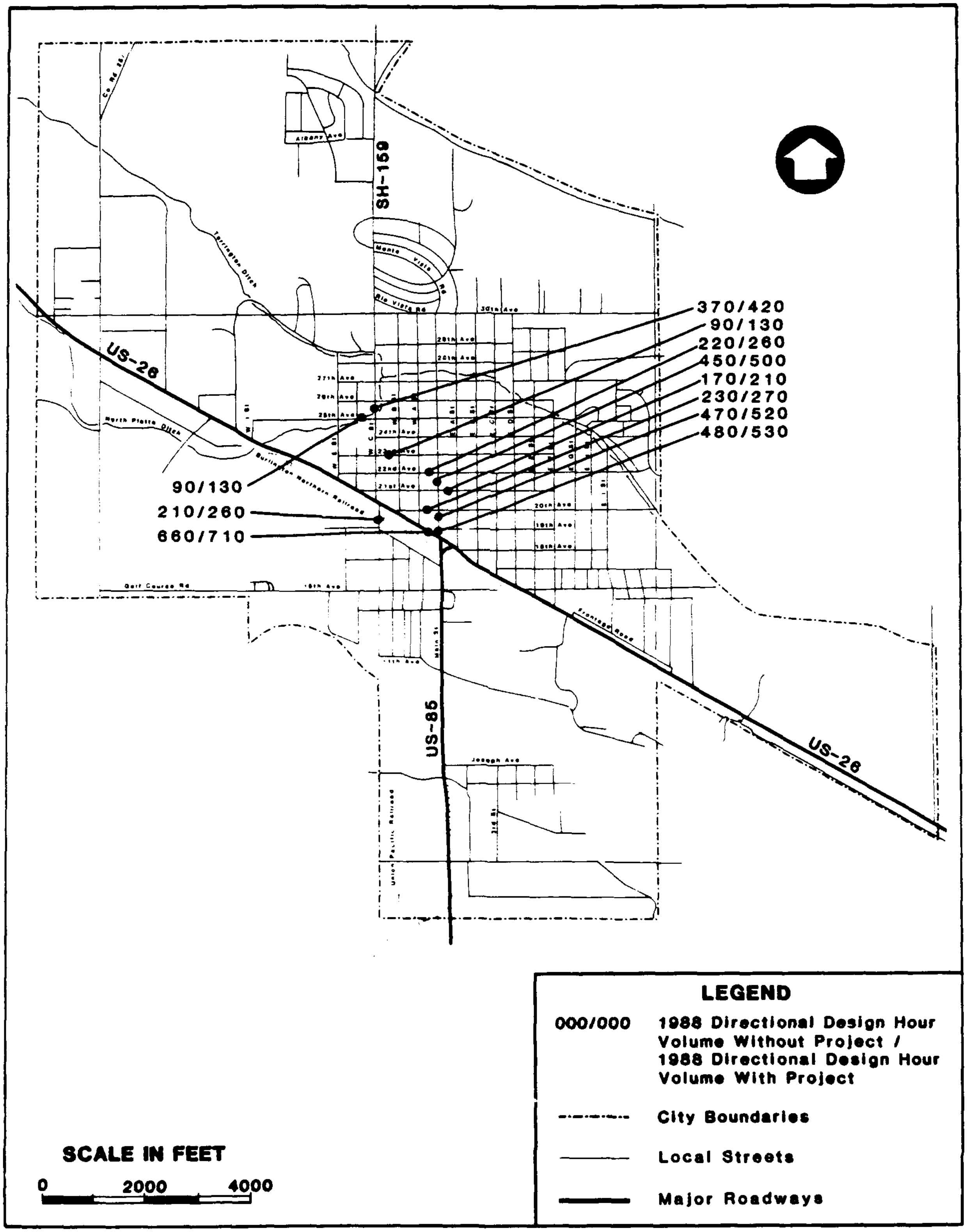


FIGURE 3.5.1-10 1988 ESTIMATED TRAFFIC VOLUMES WITH AND WITHOUT PROJECT IN TOWN OF TORRINGTON

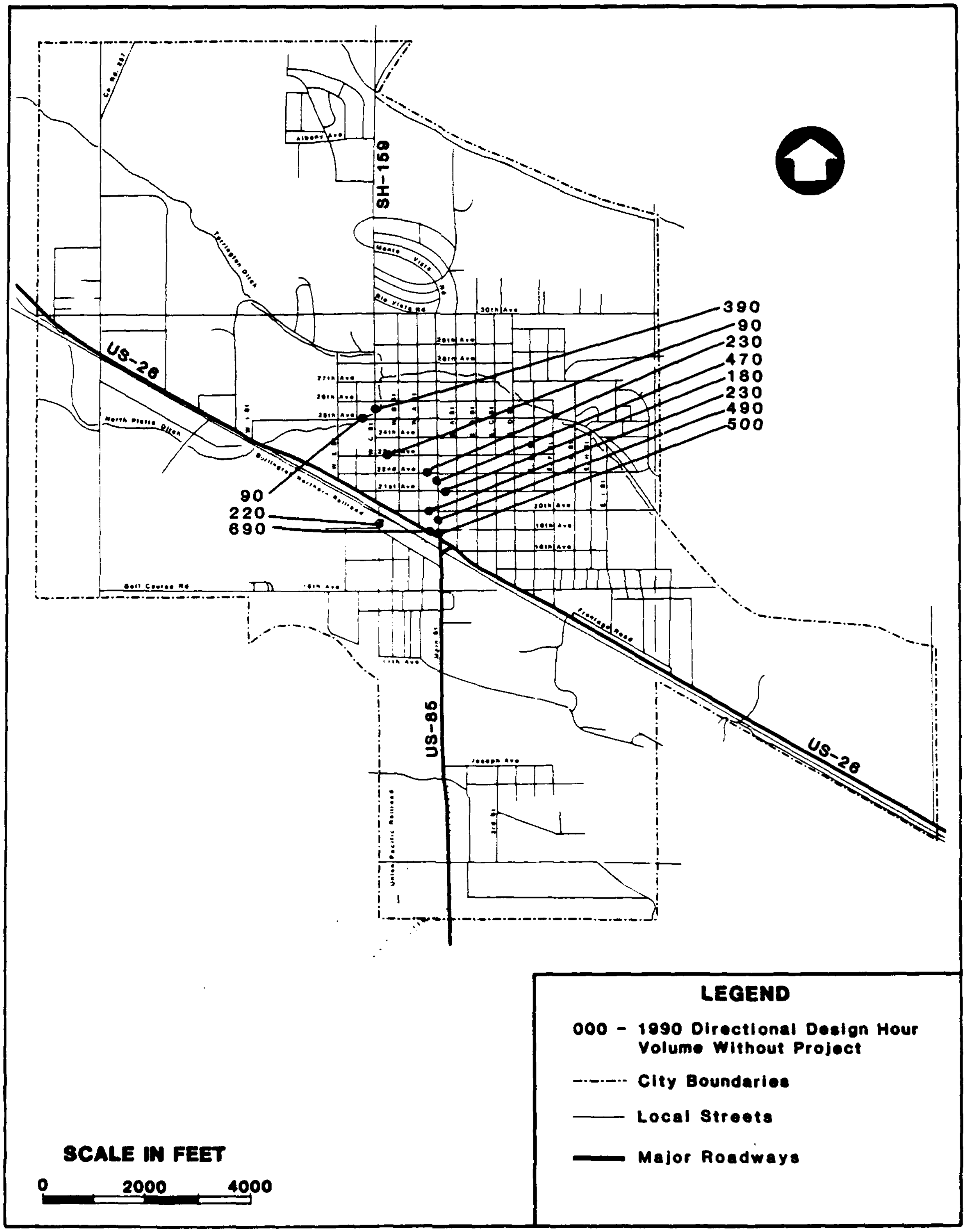


FIGURE 3.5.1-11 1990 ESTIMATED TRAFFIC VOLUMES WITHOUT PROJECT IN TOWN OF TORRINGTON

3.5.1.1.1.4 Kimball County, Nebraska

Consideration was given to the project-related transportation impact on population centers of Kimball County. Based on available information, it became apparent that the countywide rural road network associated with the LF modifications needed detailed study. Population and associated traffic increases for Bushnell were negligible and did not warrant detailed study.

Currently available information indicates that Kimball may be a dispatch station for the project and warranted study. Figures 3.5.1-12 and 3.5.1-13 show 1986 traffic volumes, with and without project, and 1990 baseline traffic volumes for Kimball.

3.5.1.1.1.5 Banner County, Nebraska

Consideration was given to the project-related transportation impact on population centers of Banner County. Based on available information, it became apparent that the countywide rural road network associated with the LF modifications needed detailed study. Population and associated traffic increases for Harrisburg were negligible and did not warrant detailed study.

3.5.1.1.1.6 Scotts Bluff County, Nebraska

Consideration was given to the project-related transportation impact on population centers of Scotts Bluff County. Based on available information, it became apparent that the countywide rural road network associated with the LF modifications needed detailed study. Population and associated traffic increases for population centers, including, Mitchell, Morrill, Terrytown, and Lyman were negligible and did not warrant detailed study.

3.5.1.1.2 Proposed Action

3.5.1.1.2.1 Laramie County, Wyoming

Cheyenne. Figures 3.5.1-14 and 3.5.1-15 show the project-related 1985 ADT volumes on the Cheyenne roadway network.

Under the Proposed Action for 1985 (the peak onbase construction year), the assignment of AM peak-hour traffic volumes indicates that several roadway sections, intersections, and interchanges may have traffic volume increases. Details of this analysis are shown in Appendix A. Many additional intersections will have a negligible impact. Project-related operational traffic beginning in 1990 will have a negligible and not significant impact.

Road traffic demand on the Cheyenne roadway system under the Proposed Action will have an overall ~~moderate, short-term, local~~ impact that will be significant because it will reduce level of service below minimum desirable design standards. In particular, level of service decreases will occur at the Interstate 25 at Randall interchange; at the intersections of Yellowstone Road with Prairie Avenue and Central Avenue; at various intersections on 19th Street and 20th Street between Pershing Boulevard and Missile Drive; at various intersections on Pershing Boulevard between Converse Avenue and Randall Avenue; at the intersections of 16th Street with Ames Avenue and Missile Drive; at the intersections of 24th Street with Central Avenue and

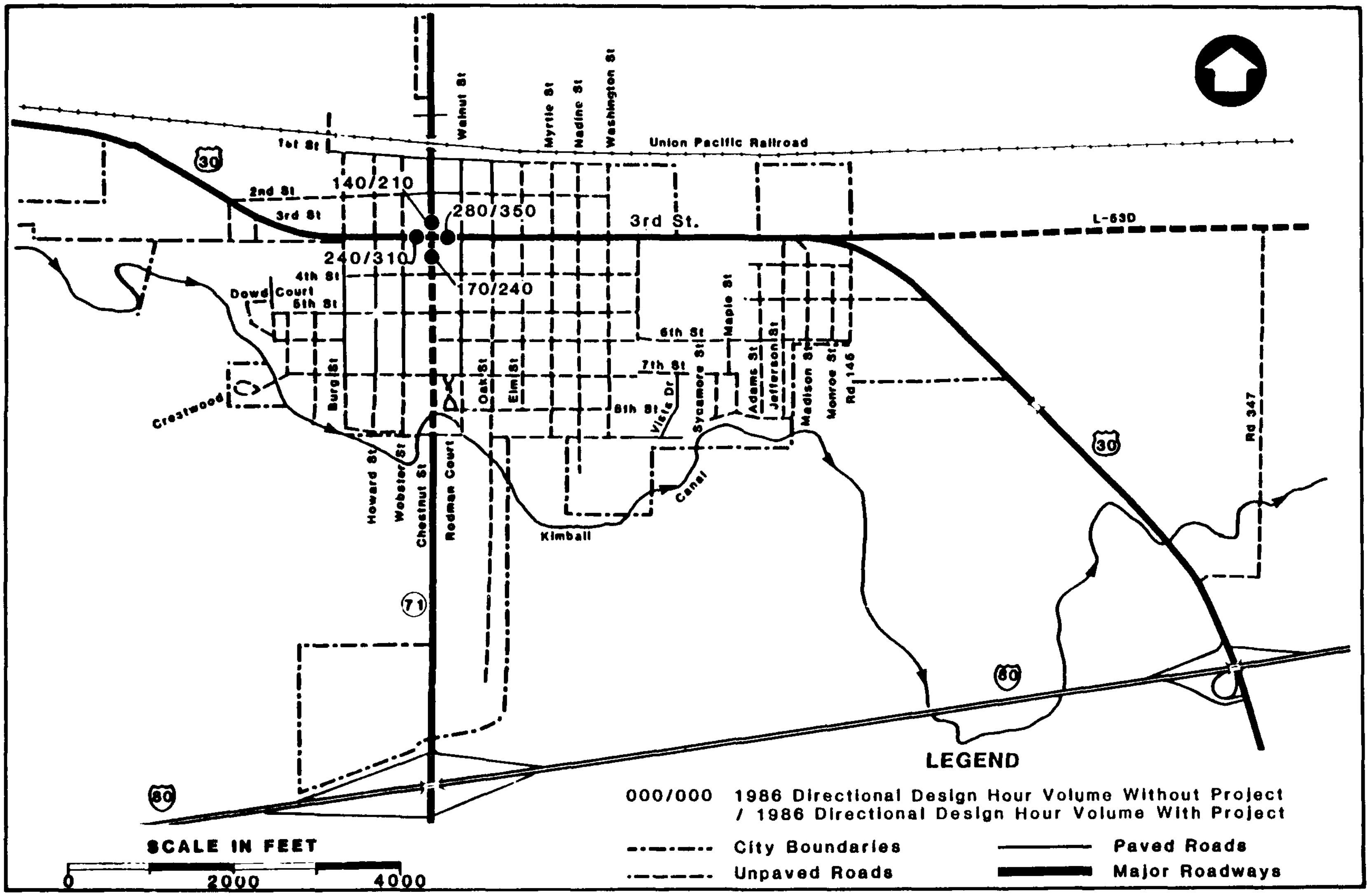


FIGURE 3.5.1-12 1986 ESTIMATED TRAFFIC VOLUMES WITH AND WITHOUT PROJECT IN CITY OF KIMBALL

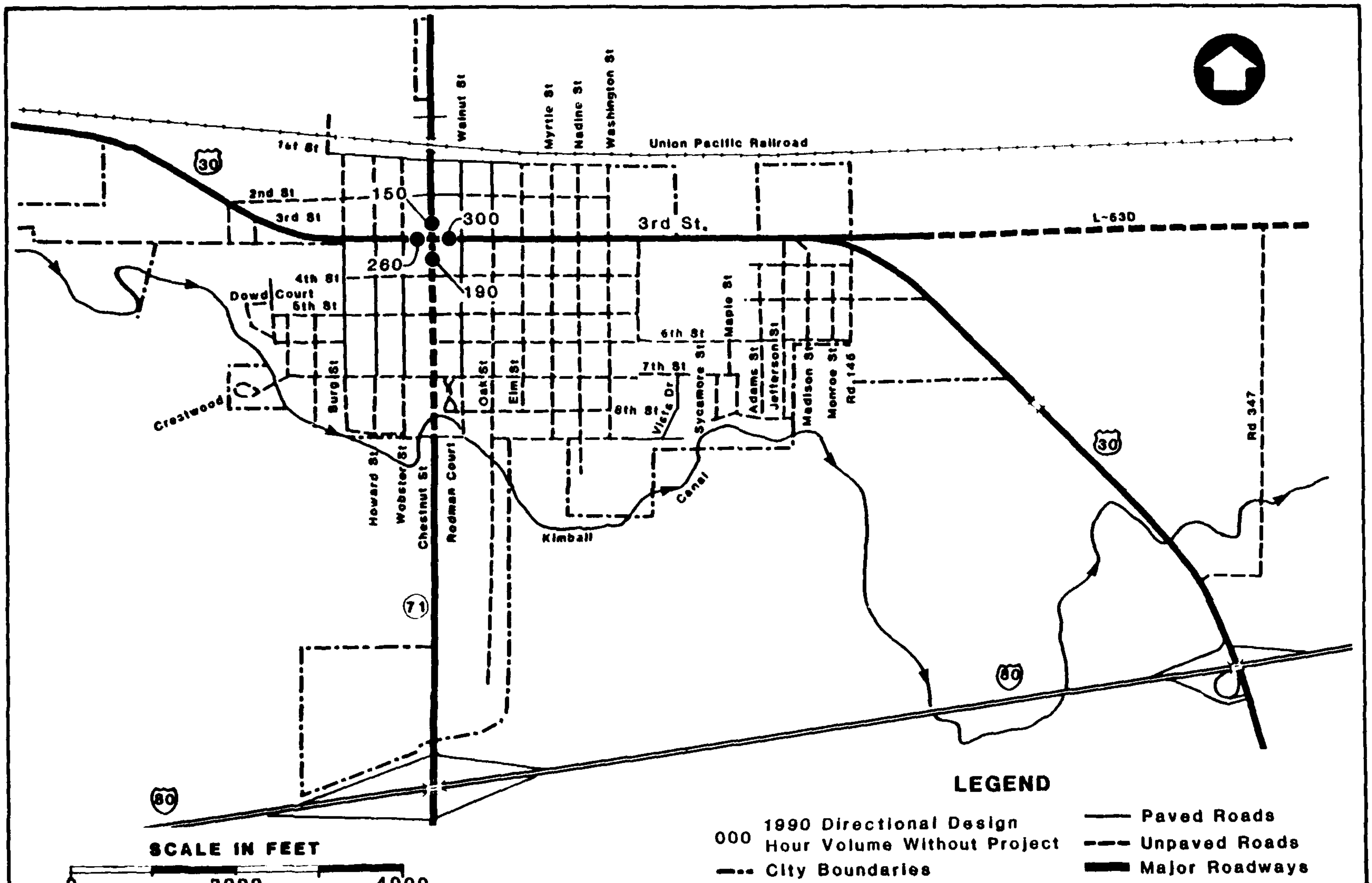


FIGURE 3.5.1-13 1990 ESTIMATED TRAFFIC VOLUMES WITHOUT PROJECT IN CITY OF KIMBALL

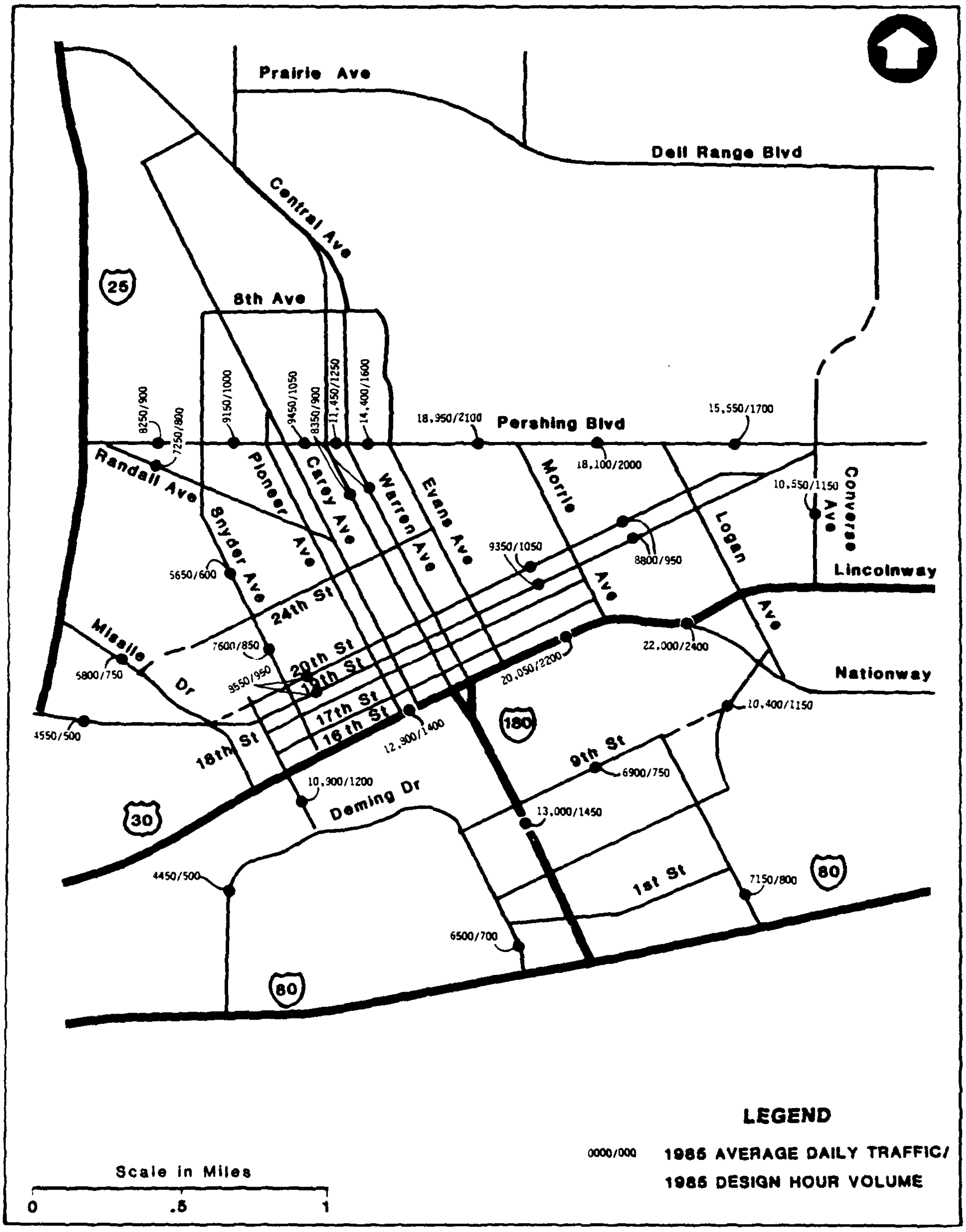


FIGURE 3.5.1-14 1985 ESTIMATED TRAFFIC PROJECTIONS IN DOWNTOWN CHEYENNE WITH PROJECT

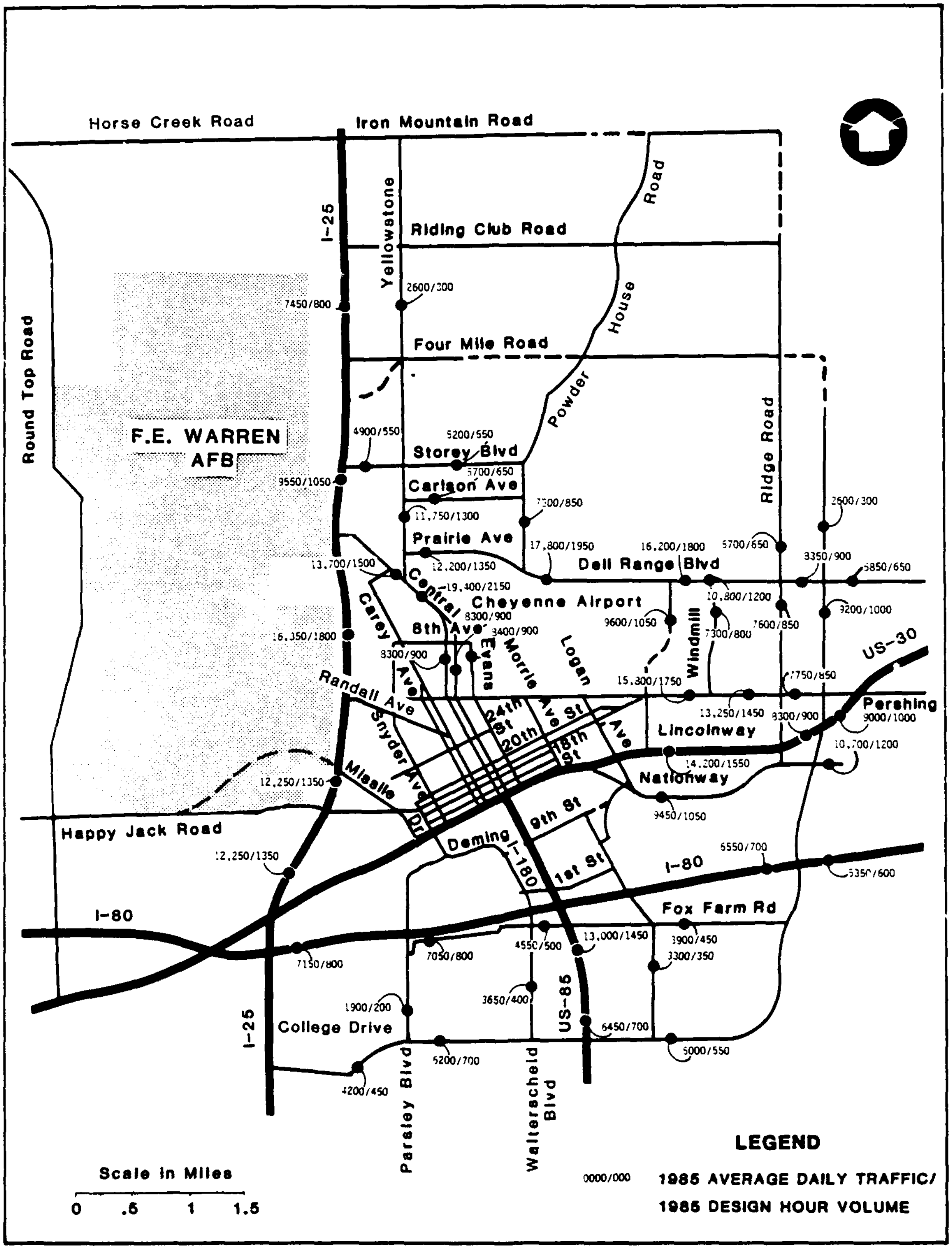


FIGURE 3.5.1-15 1985 ESTIMATED TRAFFIC PROJECTIONS IN THE CHEYENNE AREA WITH PROJECT

Carey Avenue; and at the intersection of Snyder Avenue with Randall Avenue. Level of service reductions at some of these intersections have moderate or high impacts. Several impacts are significant since the level of service is reduced below minimum desirable design standards. There is an overall moderate, short-term, local impact that is significant.

A moderate, short-term, local level of impact that is significant will occur due to the length of queues at the Randall Avenue gate entrance to F.E. Warren AFB, and at other intersections in Cheyenne. The impact will be significant since the queues may extend to the adjacent intersections. There will be a moderate, short-term level of impact in safety at the Randall Avenue interchange due to the potential for accidents. This is significant because it will require geometric improvements to the interchange. However, at the overall local level, there will be a low, not significant impact on safety in terms of the number of accidents resulting in property damage and minor injuries. At various intersections there will be low impacts in the amount of delay motorists will experience.

Cheyenne's population is expected to increase by 3.9 percent due to the project and there will be a corresponding increase in traffic on city streets. As the level of street maintenance is affected by traffic, maintenance requirements will also increase during project implementation. This will have a low impact on the physical condition of city streets that will not be significant. Extra truck traffic due to construction activities at F.E. Warren AFB is estimated at 18 trucks per working day for the years 1984 to 1986. The impact of this traffic will be negligible.

The higher traffic in Cheyenne due to the city's population increase will have a low impact on the physical condition of city streets, which will be corrected during routine maintenance. This impact will not be significant.

Three alternative road configurations (referred to as R1, R2, and R3 in Figures 3.5.1-16 through 3.5.1-18) were specified for F.E. Warren AFB. Alternative R2 is the Proposed Action. These alternatives essentially offer varying means of access to the Stage Storage Area and the Weapons Storage Area. Both R1 and R2 involve the realignment of Happy Jack Road to the Missile Drive interchange with Interstate 25. This includes the potential removal of the existing Happy Jack Road bridge over Interstate 25. This realignment of Happy Jack Road has been proposed by state and local transportation officials independently of the Peacekeeper project. Alternative R1 also proposes that the Country Club Road bridge be raised or that the Interstate 25 grade be lowered at this crossing. Alternative R3 proposes that Round Top Road be utilized for access to either Interstate 80 or U.S. 30. A new interchange with Interstate 80 would be required.

Some motorists who live near the Happy Jack Road crossing with Interstate 25 may find it inconvenient to use Missile Drive rather than the present Happy Jack Road crossing. However, the majority of motorists who use Happy Jack Road will have the following advantages due to the realignment:

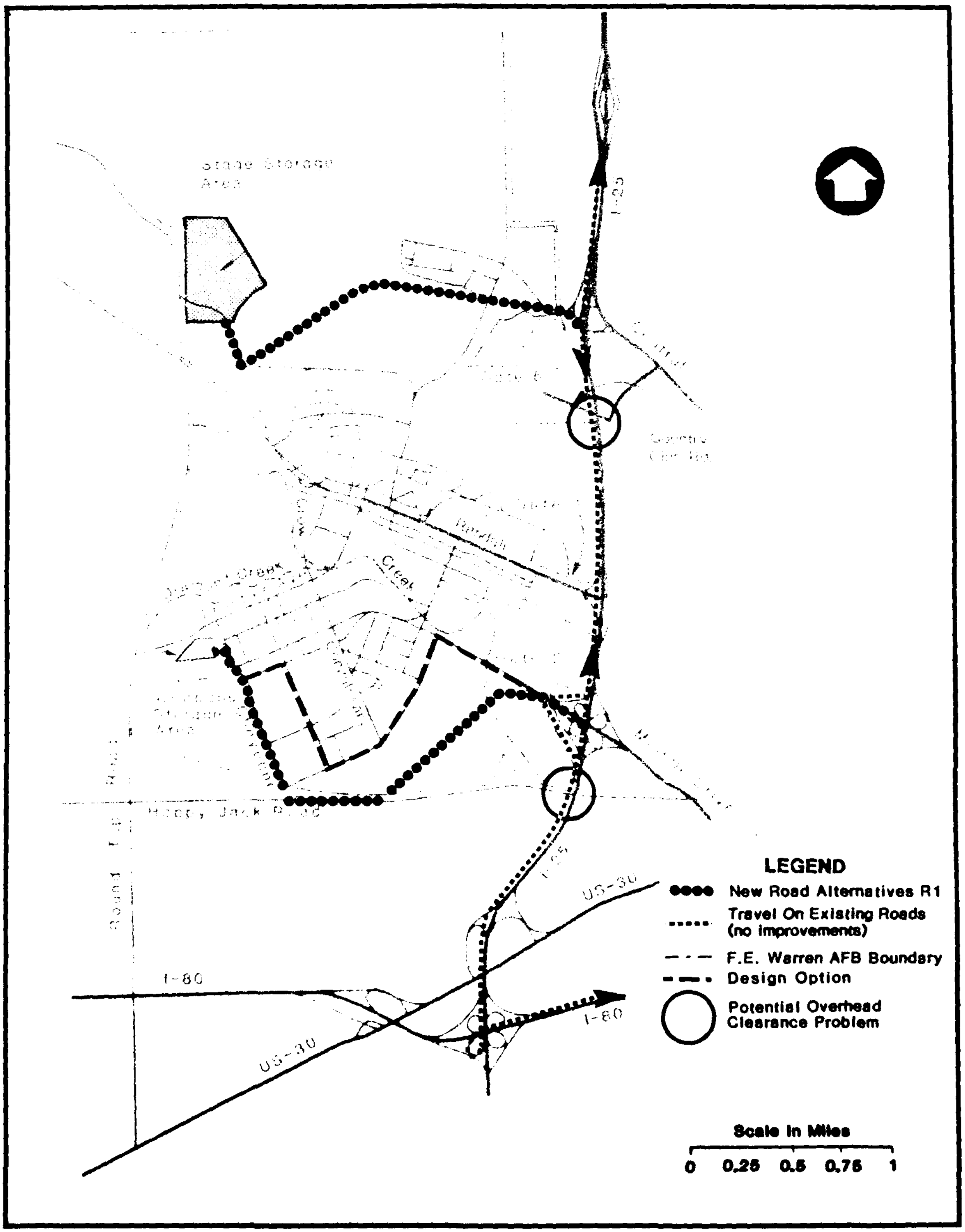


FIGURE 3.5.1-16 NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R1

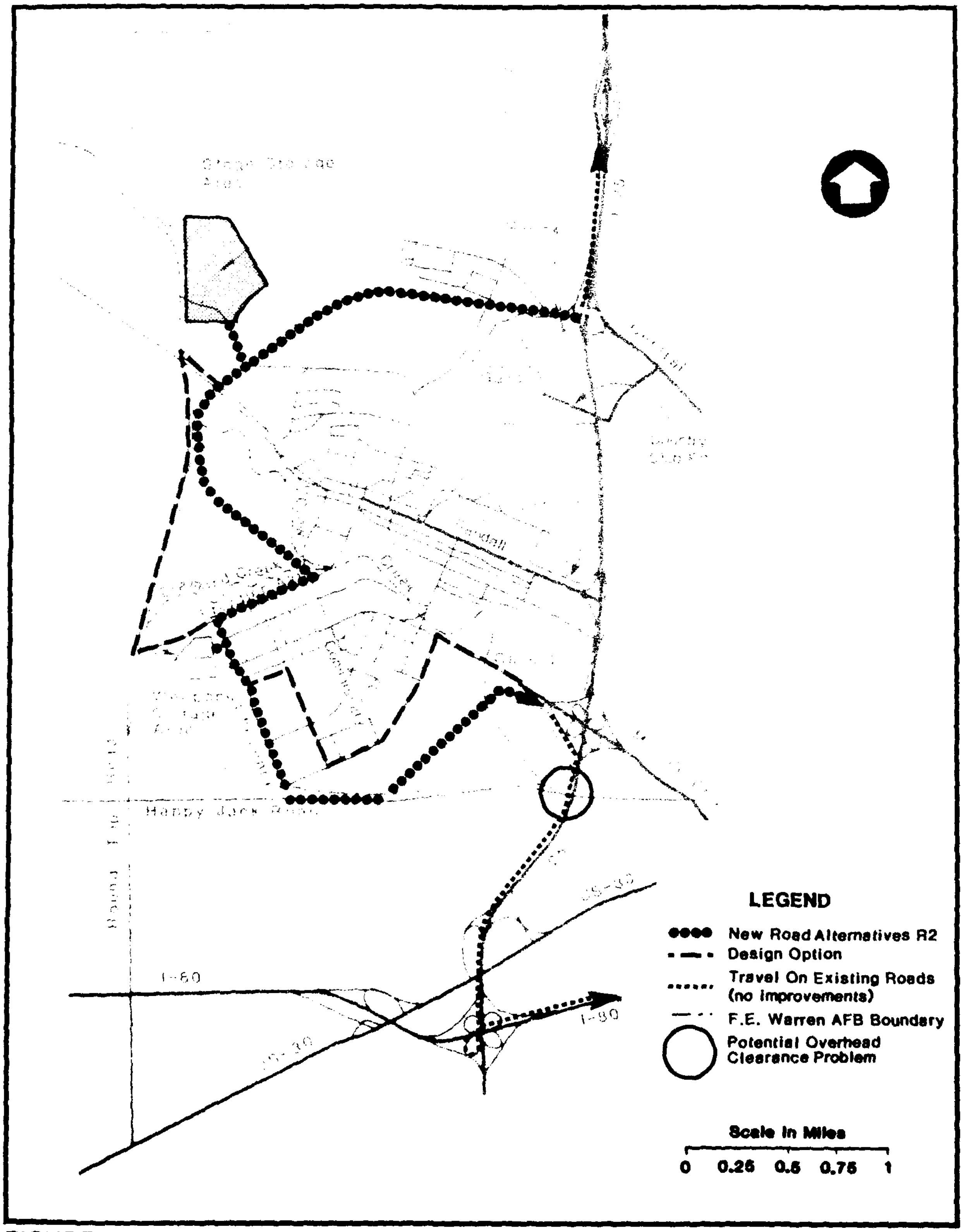


FIGURE 3.5.1-17 NEW ROADS AT F.E. WARREN AFB: PROPOSED ACTION R2

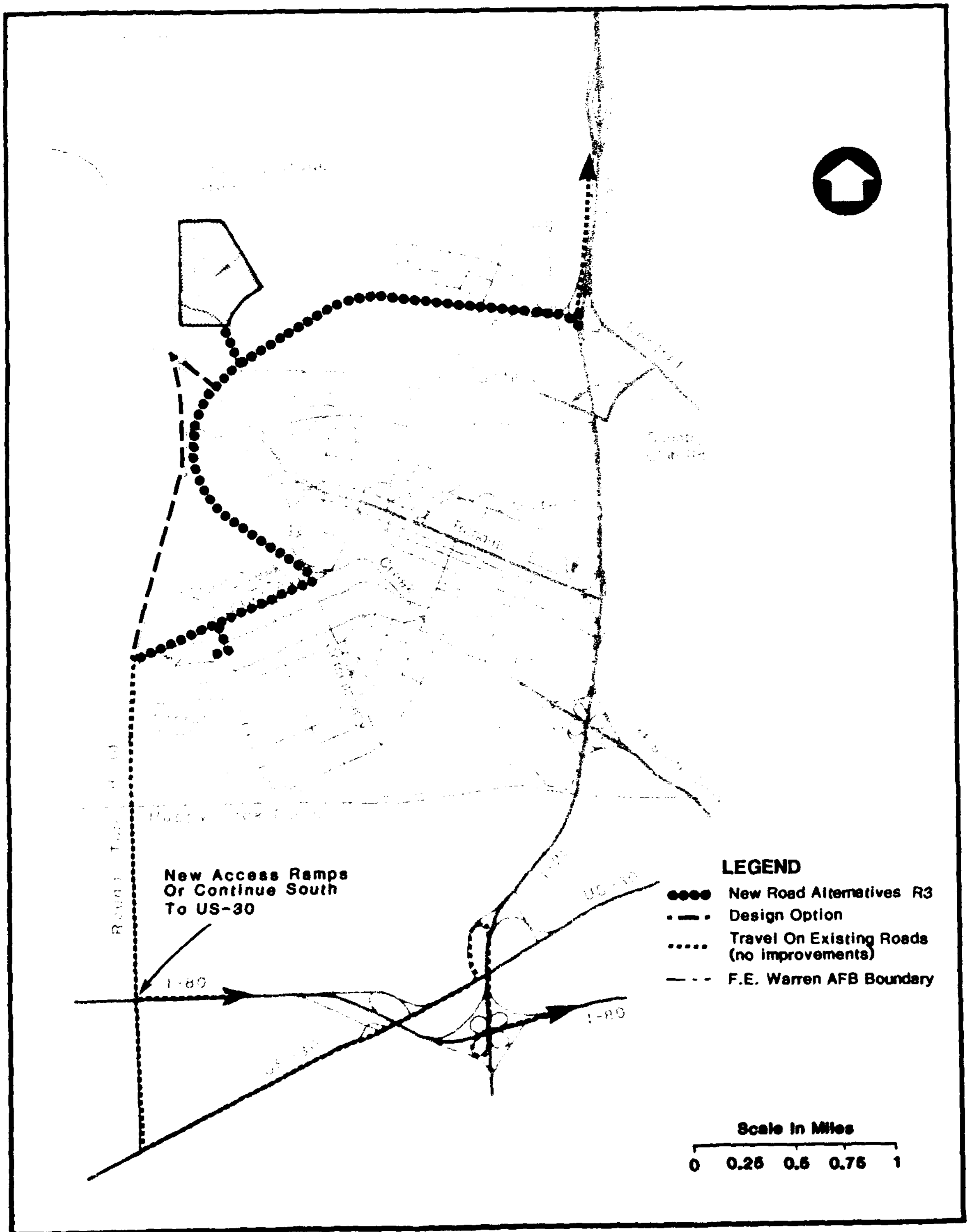


FIGURE 3.5.1-18 NEW ROADS AT F.E. WARREN AFB: ALTERNATIVE R3

- Faster access to Interstates 25 or 80 via the Missile Drive/Interstate 25 interchange.

- Safer access to downtown Cheyenne than is available via the hazardous Colorado and Southern Railroad underpass "tubes" on Happy Jack Road east of Interstate 25.

Thus, the Happy Jack Road realignment should result in a long-term benefit. No short-term construction delays should be encountered by Happy Jack Road motorists since the realignment will be completed before traffic is diverted from the present Interstate 25 crossing. Construction delays on Interstate 25 may be encountered when the Happy Jack Road bridge is removed for R1 and R2, but these delays should have low and not significant impact.

Alternative R1 will have a high level of impact that will be significant due to delays associated with the construction phase of the Country Club Road bridge improvements. The current bridge is too low for Peacekeeper traffic and either the bridge must be raised or the roadway lowered. If the bridge is raised, the existing traffic will have to be diverted to the Interstate 25/ Central Avenue interchange. If the Interstate 25 grade is lowered, the Interstate 25 motorists will be delayed during this construction operation.

Proposed Action R2 and Alternative R1 have a low and not significant impact due to construction delays encountered when the Happy Jack Road bridge is removed.

Alternative R3 will have a low impact that will not be significant due to minor construction delays associated with the physical improvements to Interstate 80 and Round Top Road. This alternative includes the construction of a new diamond interchange with Interstate 80, which should cause only minor construction delays.

A design option to R1 and R2 involves the retention of the present Happy Jack Road and Country Club Road bridges with the existing vertical clearances over Interstate 25. It may be possible for the stage transporter vehicle to operate with the existing clearances under certain driving conditions and with lane usage restrictions. If this design option is adopted, the impacts associated with the bridge changes would not be applicable.

A design option for R2 and R3 involves the utilization of Round Top Road as a means of connecting the Stage Storage Area and the Weapons Storage Area. It is assumed that a new bridge structure will be required for the Crow Creek crossing. It is further assumed that a temporary structure will be provided during the building of the new bridge. This will minimize delays for Round Top Road motorists and result in a low and not significant impact for this design option. Also, the roadway improvements on F.E. Warren AFB associated with R1, R2, and R3 will cause minimum delays and will result in low and not significant impacts.

Implementation of R1, R2, or R3 would provide for the separation of project-related traffic from other base traffic, resulting in long-term benefits and improved circulation on the base. Both R2 and R3 provide a direct connection between the Weapons and Stage Storage Areas. This connection will facilitate

the onbase movement of Peacekeeper vehicles between these areas and reduce the impact on offbase roadways which occur with R1.

Regardless of which alternative is selected, it appears that general traffic will continue to utilize Gates No. 1 and 2 due to the proximity to Cheyenne population centers. The alternative Round Top Road entrances will be primarily used by the stage transporter vehicle and associated operations.

Analysis indicated that project-related growth in Pine Bluffs will have a negligible traffic impact.

3.5.1.1.2.2 Platte County, Wyoming

Currently available information indicates that Wheatland's population will increase as a result of the project. The traffic analysis identified three intersections which will be impacted:

- o Ninth Street and South Street: LOS in all directions reduced from B/C to C/D;
- o 16th Street and South Street: LOS for South Street reduced from B/C to D; and
- o Ninth Street and Gilchrist Street: LOS for Ninth Street reduced from B/C to C/D.

These impacts which range from low to high, will be significant.

The town of Chugwater was identified in a preliminary traffic analysis as warranting further study; however, the town was found to be negligibly impacted by the level of traffic increase associated with the project.

3.5.1.1.2.3 Goshen County, Wyoming

The traffic analysis for Torrington identified one intersection with LOS reduction. The Main Street intersection with U.S. 26 and 85 will have a LOS reduction from A to C resulting in a moderate and significant impact.

3.5.1.1.2.4 Kimball County, Nebraska

Based on current information, it appears that road traffic demand in Kimball under the project would have an overall negligible level of impact on the roadway system. LOS would have a negligible level of impact as there are no changes in LOS.

Generally speaking, the public would not notice any significant change in traffic conditions. Impacts on traffic operations and safety would be negligible with the road system continuing to operate at high levels of service.

3.5.1.1.2.5 Banner County, Nebraska

The cumulative effect of project-related activity will not result in any significant impacts in population centers.

3.5.1.1.2.6 Scotts Bluff County, Nebraska

The cumulative effect of project-related activity will not result in any significant impacts in population centers.

3.5.1.2 Rural Areas

3.5.1.2.1 Baseline Future - No Action Alternative

3.5.1.2.1.1 Agricultural Traffic in Rural Areas

Special consideration was given to agricultural harvest operations. Data from an appropriate permanent traffic counter, located in an area subject to harvest operations, were carefully studied. The Wyoming Highway Department (WHD) operates a continuous automatic traffic recorder (Station 190) on State Highway 154 near Veteran in Goshen County.

Station 190 had a 1982 ADT of 402. This is higher than the ADT figures generally found on the rural roads evaluated for this study. The effect of the November harvest is evident when comparing 1982 October and November traffic data. For example, the October ADT was 445 and the November ADT was 450. However, the peak day in October was only 656 compared to a peak day in November of 1,013. Records show that the peak day was Saturday, November 6. The volume on Friday, November 5, was 875 and the volume on Sunday, November 7, was 757. The peak day volume was 2.5 times the ADT.

A further examination was made of the highest hourly volumes at this station. Roadways are normally designed for the 30th to 50th highest hourly traffic volumes. The chart below shows the range of the high hourly volumes.

Highest Hour of the Year (Ranking)	Hourly Traffic Volume (Vehs)	Percentage of ADT
1st	82	20.4%
10th	65	16.2%
20th	63	15.7%
30th	60	14.9%
40th	58	14.4%
50th	55	13.7%

An appraisal of this data indicates the following:

- o The highest daily volume associated with harvest may be considerably higher than the ADT (possibly by a factor of 2.5);
- o The highest hourly volumes range from 15 to 20 percent of the ADT;
- o The highest hourly volumes are well within the capacity of a 2-lane rural road; and
- o Special consideration should be given to the traffic associated with harvest operations. The agricultural vehicles are heavy, bulky, and

slow-moving. The effect of these vehicles on traffic operations is greater than their absolute numbers would indicate.

Similar relationships between peak harvest traffic and ADT can be expected in the other counties within the ROI.

3.5.1.2.1.2 Laramie County, Wyoming

Baseline (without the project) ADT volumes on all project-related roads in Laramie County were estimated for the peak construction year and the projected operational phase. As discussed previously, the peak year of construction in rural areas will depend upon phasing of LF-related construction. Based on available information, it was assumed that 1987 would be the peak construction year for much of Laramie County. Therefore, 1987 was used for the baseline analysis for the project. In addition, 1990 was assumed to be the year in which the project operational phase would begin. Thus, 1990 was also used in the baseline analysis for the No Action Alternative. The 1987 baseline ADT volumes for project-related roads in Laramie County were estimated by applying average annual growth rates to the existing 1983 ADT volumes. These ADT growth rates were based upon a review of previous traffic trends and discussions with Wyoming State Highway officials. Average annual growth rates by road classification are summarized below:

Rural Interstates	4.0 percent
Rural State Highways	2.5 percent
County Roads	1.0 percent

From a capacity standpoint, all 1987 estimated baseline ADT volumes on project-related roads in the county would remain low and would be well within the capacity of the existing roadways (Figure 3.5.1-19). For example, 1987 baseline ADT for links of U.S. 85 within the county would range from 1,330 to 1,440, an increase ranging from 130 to 140 over existing 1983 volumes. The highest 1987 estimated baseline traffic volumes in the county would be 4,800 ADT for portions of Interstates 80 and 25, still well below this roadway's capacity volume. For county roads, the 1987 estimated baseline volumes are much lower than the capacity of the roadways.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual growth rates were applied to 1983 traffic volumes (Figure 3.5.1-20). Operational phase estimated ADT volumes for roadways within the county were well within the capacity of those roadways to accommodate the increased volumes. For example, 1990 baseline ADT volumes on links of U.S. 85 would range from 1,430 to 1,550 or an increase of 230 and 250, respectively, over 1983 volumes. The highest 1990 estimated baseline ADT volumes in the county would be 5,400 on two portions of Interstates 80 and 25, still well below this roadway's capacity. Baseline 1990 volumes on county roads would again fall far below the capacity of the roadways.

For physical conditions of roadways within the county under No Action conditions, it was assumed that Minuteman T/E routes would continue to be used during baseline years and their physical condition would remain essentially unchanged with the current level of maintenance.

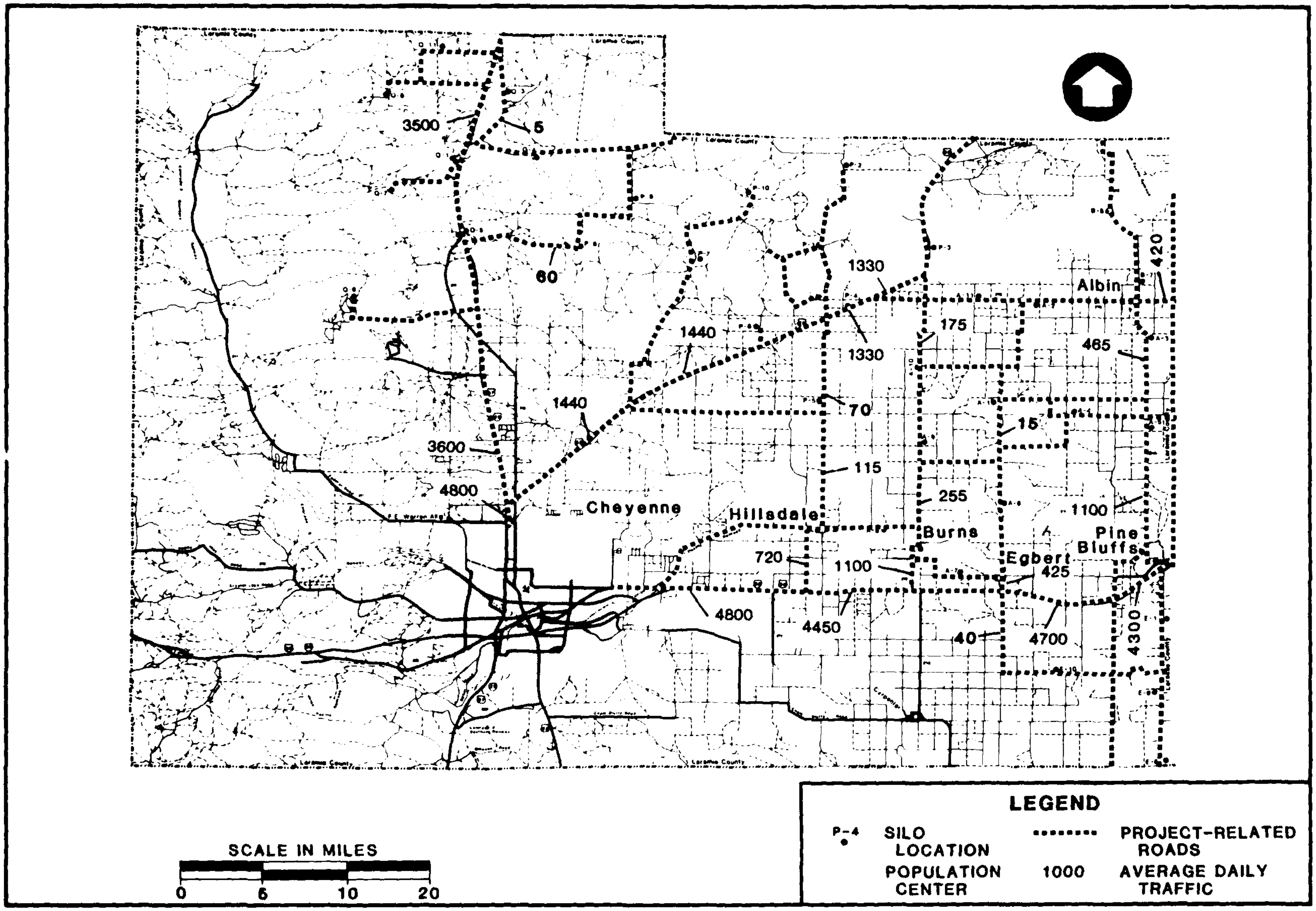


FIGURE 3.5.1-19 LARAMIE COUNTY - 1987 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

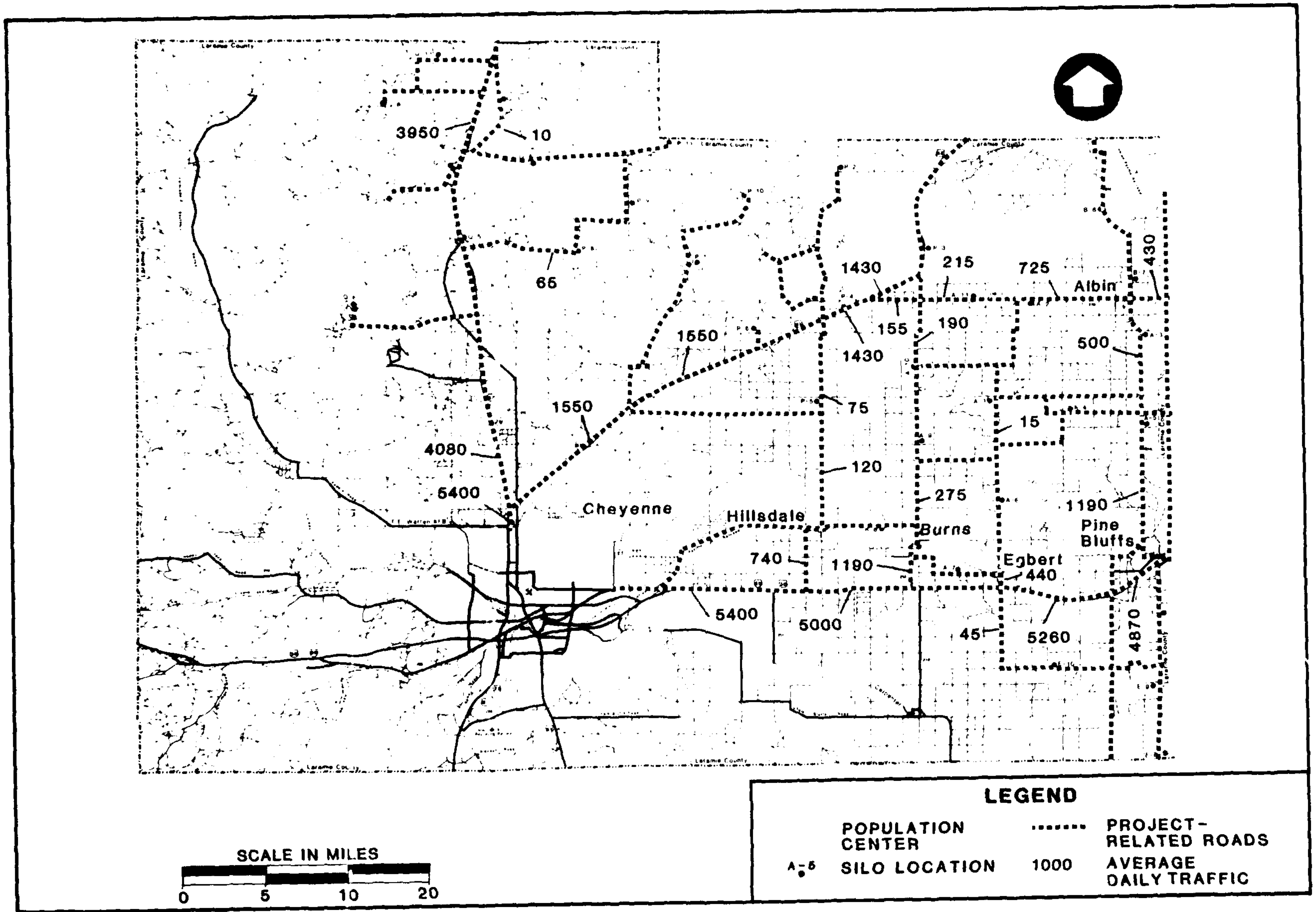


FIGURE 3.5.1-20 LARAMIE COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

3.5.1.2.1.3 Platte County, Wyoming

Baseline (without the project) ADT volumes on all project-related roads in Platte County were estimated for the peak construction year and the project operational phase. As discussed previously, the peak year of construction in rural areas will depend upon scheduling of LF-related construction. Based on available information, it was assumed that 1986 would be the peak construction year for much of Platte County. Therefore, 1986 was used for the baseline analysis. In addition, 1990 was assumed to be the year in which the project's operational phase would begin. Thus, 1990 was also used in the baseline analysis.

The 1986 baseline ADT volumes for project-related roads in Platte County were estimated by applying average annual traffic growth rates to the existing 1983 ADT volumes. These growth rates were based upon a review of previous traffic trends and discussions with Wyoming State Highway officials. Average annual growth rates by road classification are summarized below:

Rural Interstates	4.0 percent
Rural State Highways	2.5 percent
County Roads	1.0 percent

From a capacity standpoint, all 1986 estimated baseline ADT volumes on project-related roads in the county would remain low and would be within the capacity of the existing roadways (Figure 3.5.1-21). For example, 1986 baseline ADT for links of Interstate 25 within the county would range from 3,400 to 3,600, an increase of 400 over existing 1983 volumes. The highest 1986 estimated baseline traffic volumes in the county would be 3,600 ADT for portions of Interstate 25, a figure still well below this roadway's capacity volume. For county roads, the 1986 estimated baseline volumes are much lower than the capacity of the roadways.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual growth rates were applied to 1983 traffic volumes (Figure 3.5.1-22). Operational phase estimated ADT volumes for roadways within the county were within the capacity of those roadways to accommodate the increased volumes. For example, the 1990 baseline ADT volumes on links of Interstate 25 would range from 3,950 to 4,210 or an increase of 950 and 1,010, respectively, over 1983 volumes. The highest 1990 estimated baseline ADT volumes in the county would be 4,210 on portions of Interstate 25, still below this roadway's capacity. Baseline 1990 volumes on county roads would again fall far below the capacity of the roadways.

Under No Action it was assumed that Minuteman T/E routes would continue to be used during baseline years and their physical condition would remain essentially unchanged, with the current level of maintenance.

3.5.1.2.1.4 Goshen County, Wyoming

Baseline (without the project) ADT volumes on all project-related roads in Goshen County were estimated for the peak construction year and the project operational phase. As discussed previously, the peak year of construction in rural areas will depend upon phasing of LF-related construction. Based on available information, it was assumed that 1988 would be the peak construction

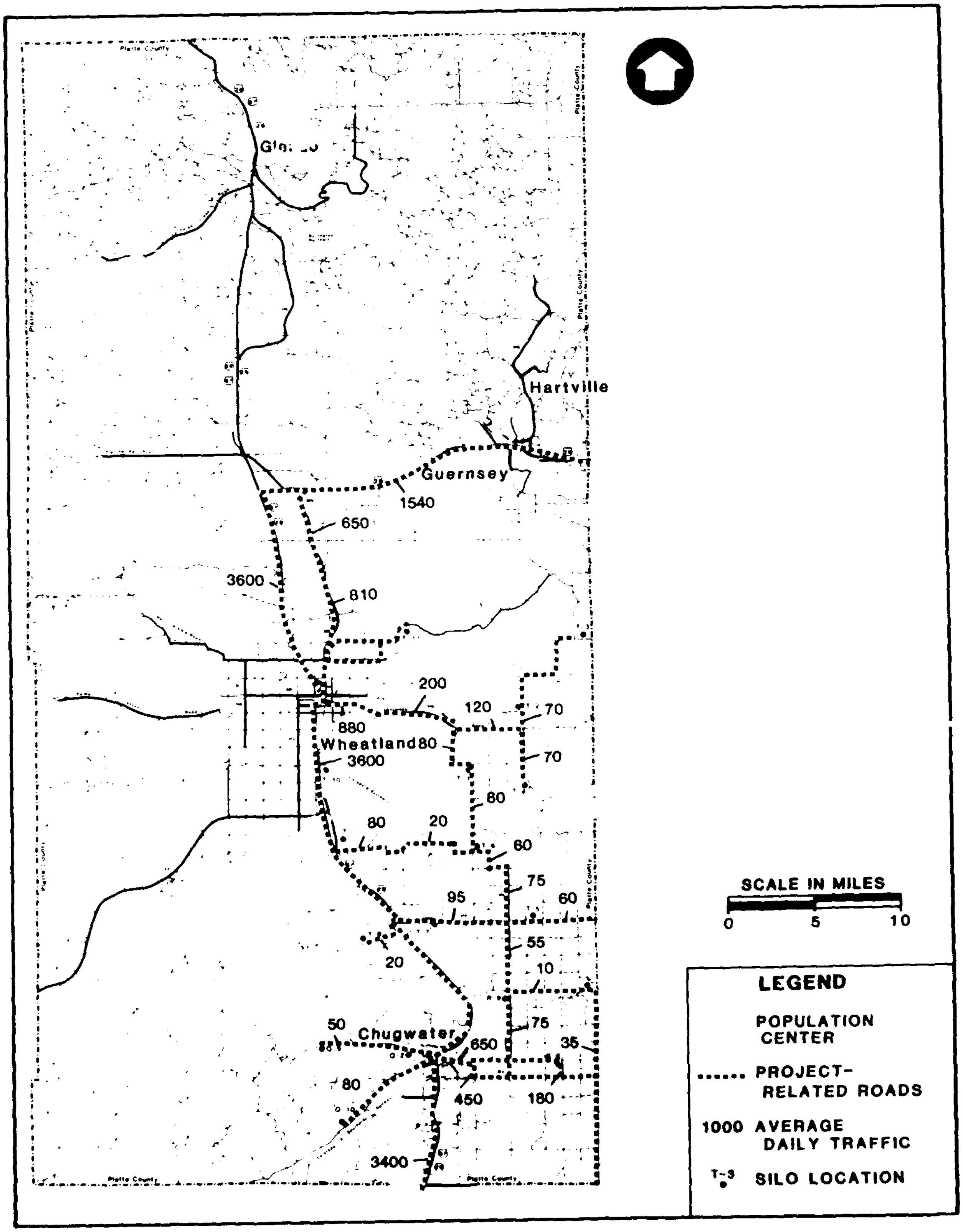


FIGURE 3.5.1-21 PLATTE COUNTY - 1986 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

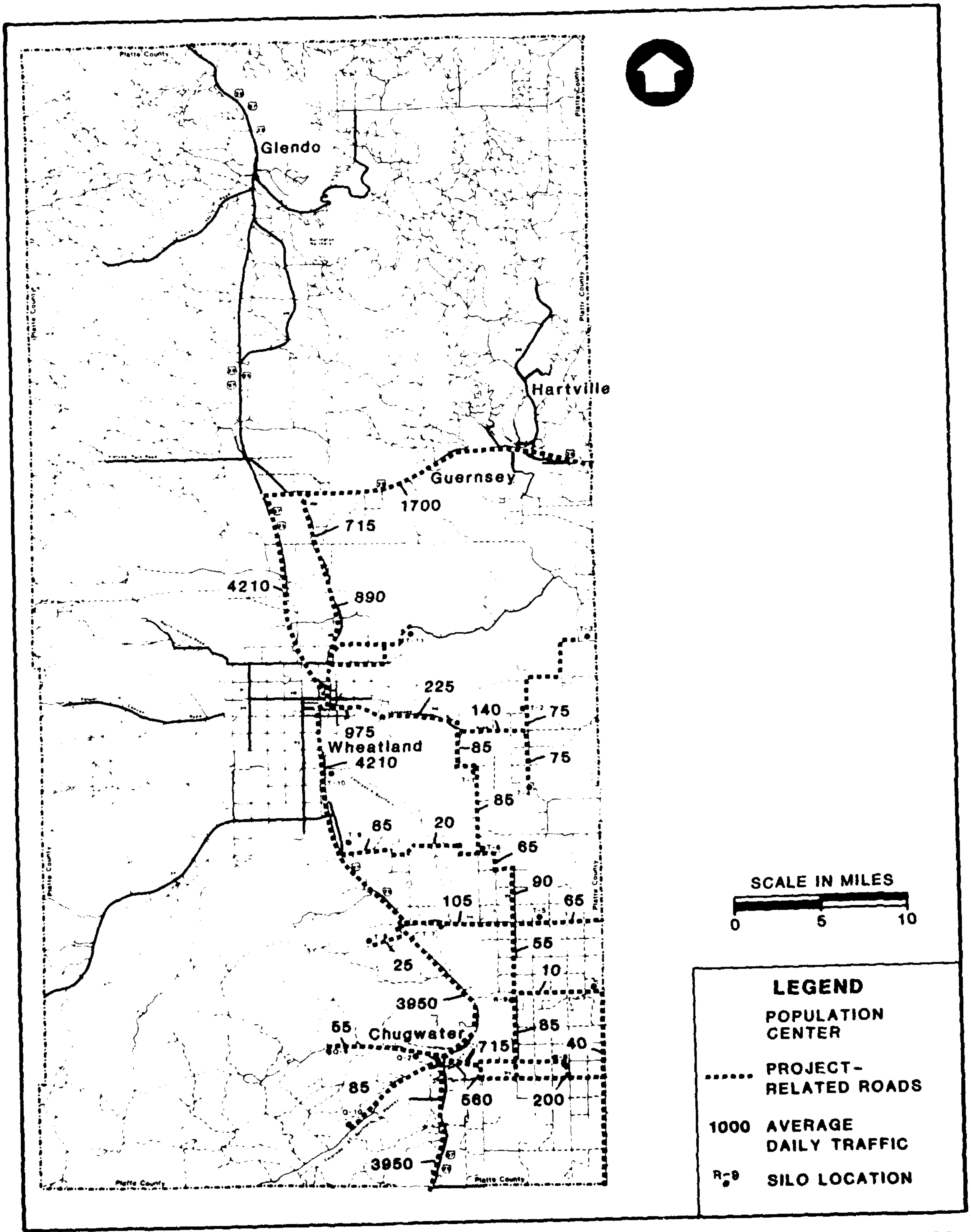


FIGURE 3.5.1-22 PLATTE COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

year for much of Goshen County. Therefore, 1988 was used for the baseline analysis. In addition, 1990 was assumed to be the year in which the project-operational phase would begin. Thus, 1990 was also used in the baseline analysis.

The 1988 baseline ADT volumes for project-related roads in Goshen County were estimated by applying average annual traffic growth rates to the existing 1983 ADT volumes. These growth rates were based upon a review of previous traffic trends and discussions with Wyoming State Highway officials. Average annual growth rates by road classification are summarized below:

Rural Interstates	4.0 percent
Rural State Highways	2.5 percent
County Roads	1.0 percent

From a capacity standpoint, all 1988 estimated baseline ADT volumes on project-related roads in the county would remain low and would be well within the capacity of the existing roadways (Figure 3.5.1-23). For example, 1988 baseline ADT for links of U.S. 85 within the county would range from 1,440 to 2,830, and increase ranging from 140 to 330 over existing 1983 volumes. The highest 1988 estimated baseline traffic volumes in the county would be 5,320 ADT for portions of U.S. 26 and 85, a figure still below these roadways' capacity volumes. For county roads, the 1988 estimated baseline volumes are much lower than the capacity of the roadways.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual growth rates were applied to 1983 traffic volumes (Figure 3.5.1-24). Operational phase estimated ADT volumes for roadways within the county were within the capacity of those roadways to accommodate the increased volumes. For example, the 1990 baseline ADT volumes on links of U.S. 85 would range from 1,550 to 2,970 or an increase of 250 and 470, respectively, over 1983 volumes. The highest 1990 estimated baseline ADT volumes in the county would be 5,580 on portions of U.S. 26 and 85, still below these roadways' capacities. Again, baseline 1990 volumes on county roads would fall far below the capacity of the roadways.

Under No Action, it was assumed that Minuteman T/E routes would continue to be used during baseline years and their physical condition would remain essentially unchanged with the current level of maintenance.

3.5.1.2.1.5 Kimball County, Nebraska

Baseline (without the project) ADT volumes on all project-related roads in Kimball County were estimated for the peak construction year and the project operational phase.

As discussed previously, the peak year of construction in rural areas will depend upon the scheduling of LF-related construction. Based on available information, it was assumed that 1989 would be the peak construction year for much of Kimball County. Therefore, 1989 was used for the baseline analysis. In addition, 1990 was assumed to be the year in which the project-operational phase would begin, thus 1990 was also used in the baseline analysis.

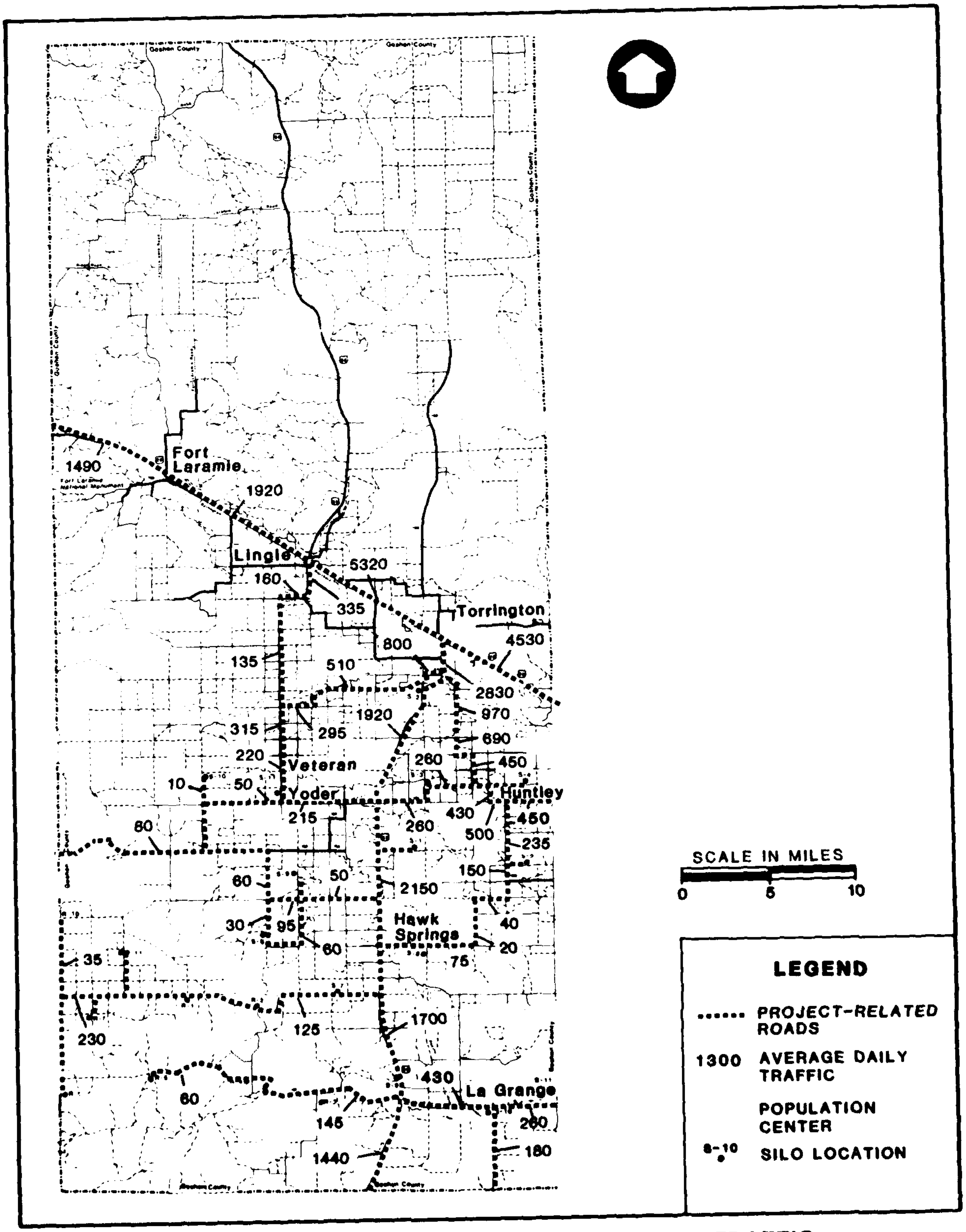


FIGURE 3.5.1-23 GOSHEN COUNTY - 1988 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

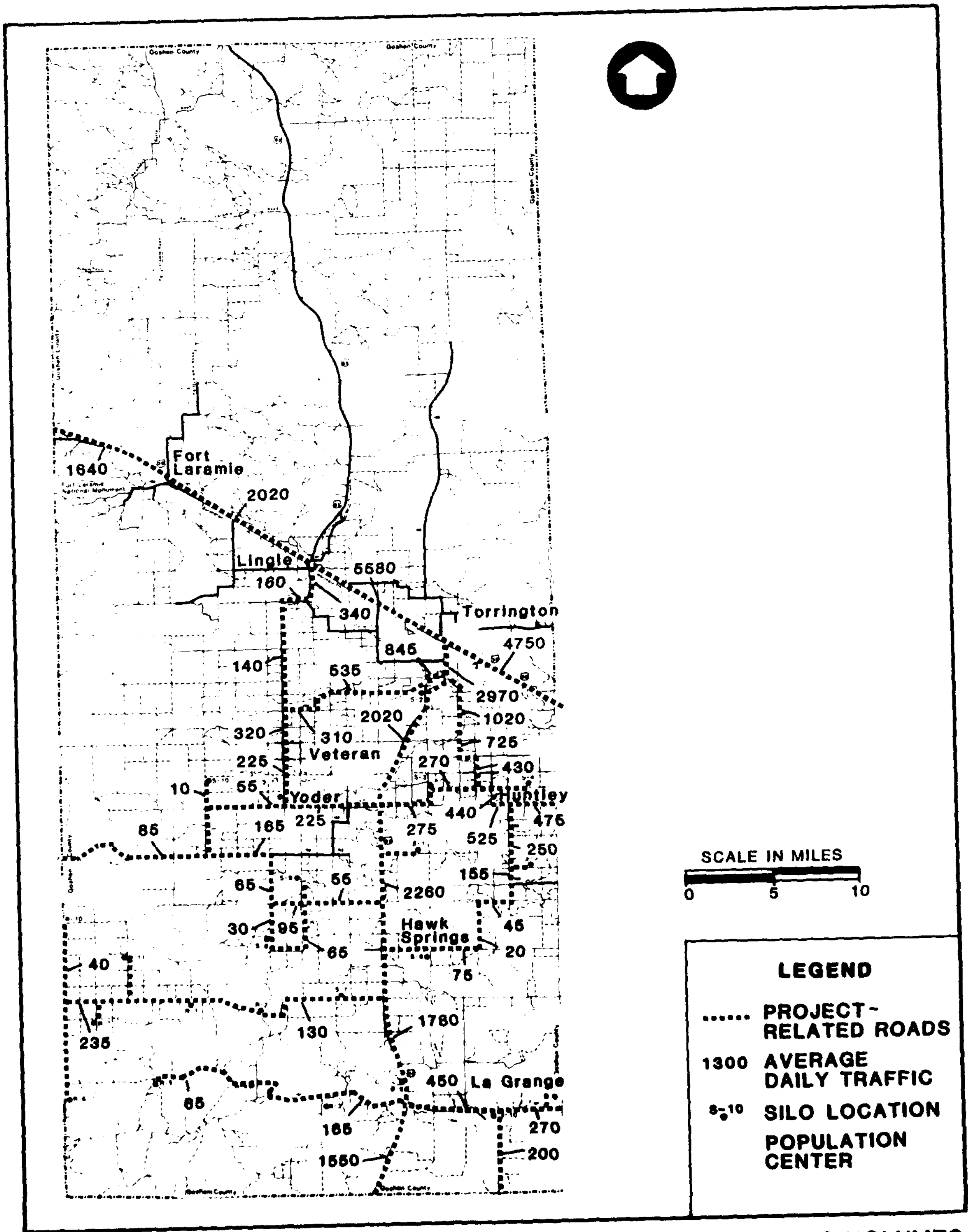


FIGURE 3.5.1-24 GOSHEN COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

The 1989 baseline ADT volumes for project-related roads in Kimball County were estimated by applying average annual traffic growth rates to the existing 1983 ADT volumes. These growth rates were based upon a review of previous traffic trends and discussions with Nebraska State Highway officials. Average annual growth rates by road classification are summarized below.

Rural Interstates	3.0 percent
Rural State Highways	2.5 percent
County Roads	1.0 percent

From a capacity standpoint, all 1989 estimated baseline ADT volumes on project-related roads in the county would remain low and would be within the capacity of the existing roadways (Figure 3.5.1-25). For example, 1989 baseline ADT for links of State Highway 71 within the county would range from 1,970 to 2,550, an increase ranging from 270 to 350 over existing 1983 volumes. The highest 1989 estimated baseline traffic volumes in the county would be 4,900 ADT for portions of Interstate 80, a figure still below this roadway's capacity volume. For county roads, the 1989 estimated baseline volumes are much lower than the capacity of the roadways.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual traffic growth rates were applied to 1983 traffic volumes through 1990 (Figure 3.5.1-26). Operational phase estimated ADT volumes for roadways within the county were within the capacity of those roadways to accommodate the increased volumes. For example, the 1990 baseline ADT volumes on links of State Highway 71 would range from 2,020 to 2,620 or an increase of 320 and 420, respectively, over 1983 volumes. The highest 1990 estimated baseline ADT volumes in the county, which would occur on portions of Interstate 80, would be 5,130, still below this roadway's capacity. Baseline 1990 volumes on county roads would again fall far below any of these volumes.

Under No Action, it was assumed that Minuteman T/E routes would continue to be used during baseline years and their physical condition would remain essentially unchanged with the current level of maintenance.

3.5.1.2.1.6 Banner County, Nebraska

Baseline (without the project) ADT volumes on all project-related roads in Banner County were estimated for the peak construction year and the project operational phase.

As discussed previously, the peak year of construction in rural areas will depend upon the phasing of LF-related construction. Based on available information, it was assumed that 1988 and 1989 would be the peak construction years for much of Banner County. Therefore, 1988 and 1989 were used for the baseline analysis. In addition, 1990 was assumed to be the year in which the project operational phase would begin. Thus, 1990 was also used in the baseline analysis.

The 1988 and 1989 baseline ADT volumes for project-related roads in Banner County were estimated by applying average traffic annual growth rates to the existing 1983 ADT volumes. These growth rates were based upon a review of

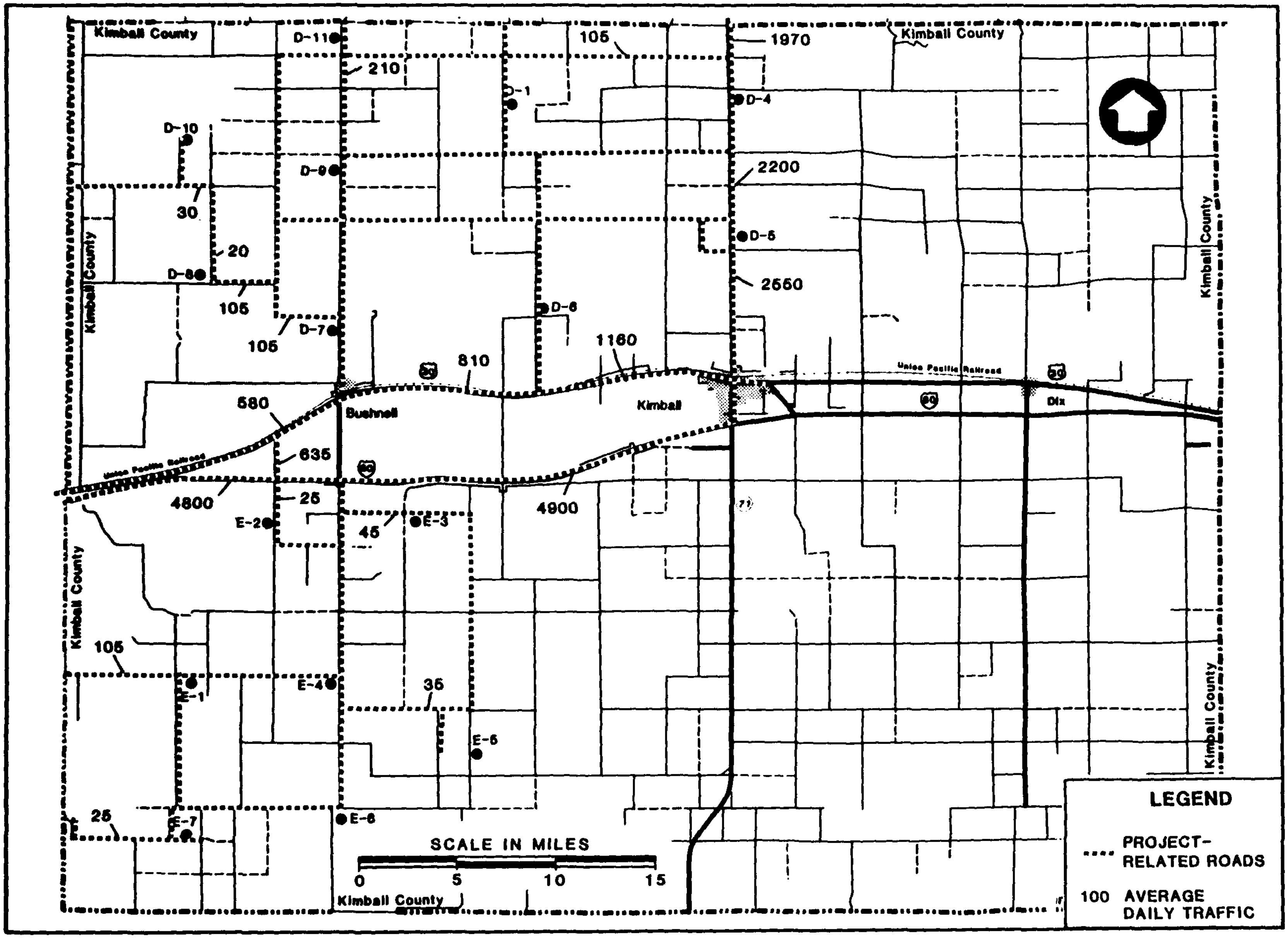


FIGURE 3.5.1-25 KIMBALL COUNTY - 1989 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

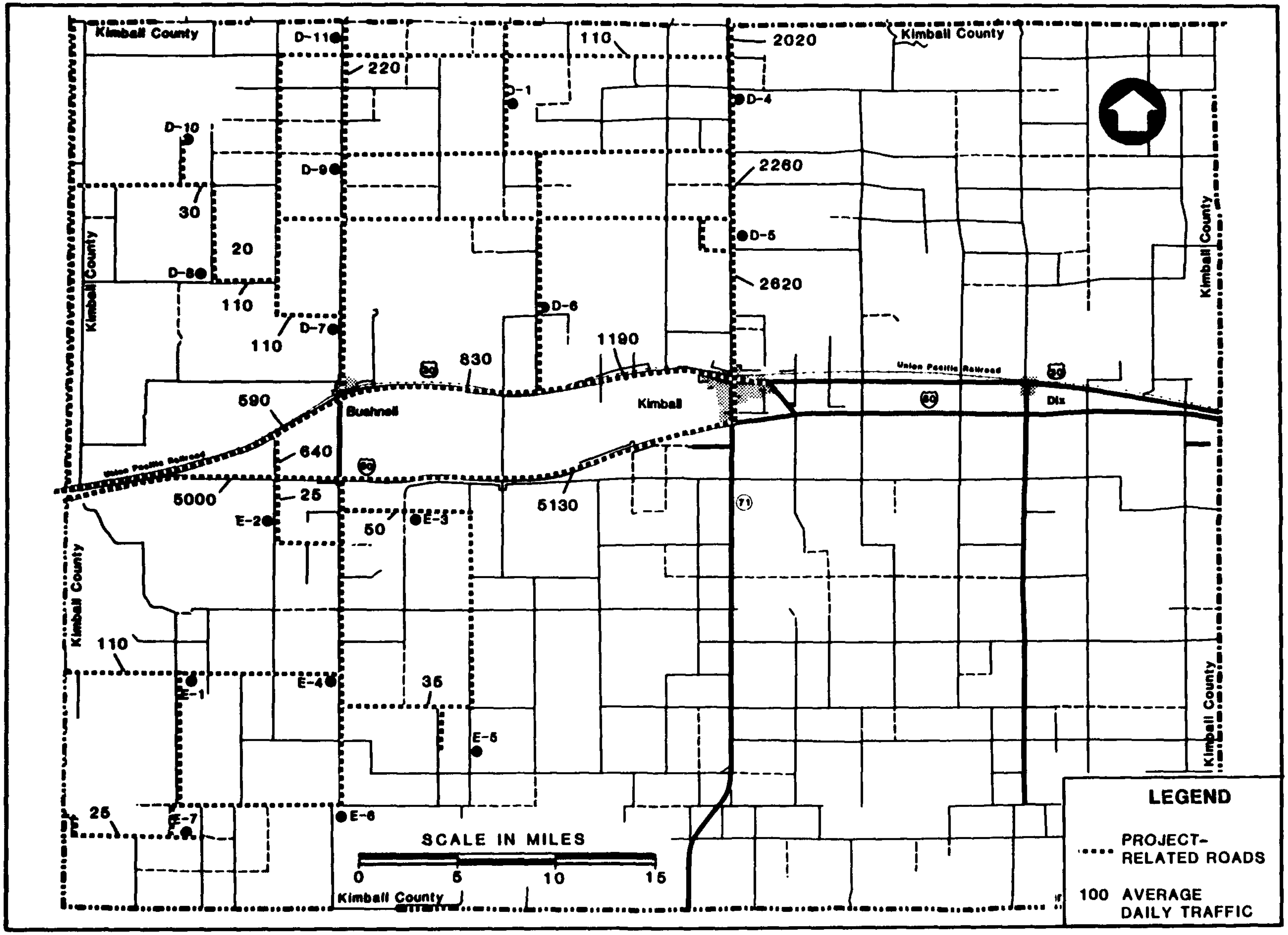


FIGURE 3.5.1-26 KIMBALL COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

previous traffic trends and discussions with Nebraska State Highway officials. Average annual traffic growth rates by road classification are summarized below:

Rural Interstates	3.0 percent
Rural State Highways	2.5 percent
County Roads	1.0 percent

From a capacity standpoint, all 1988 and 1989 estimated baseline ADT volumes on project-related roads in the county would remain low and would be within the capacity of the existing roadways (Figure 3.5.1-27). For example, 1988 and 1989 baseline ADT for links of State Highway 71 within the county would range from 1,730 to 1,920, an increase ranging from 220 to 230 over existing 1983 volumes. The 1,920 volume quoted above also represents the highest estimated baseline traffic volume in the county. This figure is still below the road's capacity volume. For county roads, the 1988 and 1989 estimated baseline volumes are much lower than the capacity of the roadways.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual growth rates were applied to 1983 traffic volumes (Figure 3.5.1-28). Operational phase estimated ADT volumes for roadways within the county were within the capacity of those roadways to accommodate the increased volumes. For example, 1990 baseline ADT volumes on links of State Highway 71 would range from 1,780 to 2,020 or an increase of 280 and 320, respectively, over 1983 volumes. The 2,020 volume quoted above also represents the highest estimated baseline traffic volume in the county. This figure is still below this roadway's capacity. Baseline 1990 volumes on county roads would again fall far below the capacity of the roadways.

Under No Action, it was assumed that Minuteman T/E routes would continue to be used during baseline years and their physical conditions would remain essentially unchanged with the current level of maintenance.

3.5.1.2.1.7 Scotts Bluff County, Nebraska

Baseline (without the project) ADT volumes on all project-related roads in Scotts Bluff County were estimated for the peak construction year and the project operational phase.

As discussed previously, the peak year of construction in rural areas will depend upon the phasing of LF-related construction. Based on available information, it was assumed that 1988 would be the peak construction year for much of Scotts Bluff County. Therefore, 1988 was used for the baseline analysis. In addition, 1990 was assumed to be the year when the operational phase of the project would begin. Thus, 1990 was also used in the baseline analysis.

The 1988 baseline ADT volumes for project-related roads in Scotts Bluff County were estimated by applying average annual traffic growth rates to the existing 1983 ADT volumes. These rates were based upon a review of previous traffic trends and discussions with Nebraska State Highway officials. Average annual growth rates by road classification are summarized below:

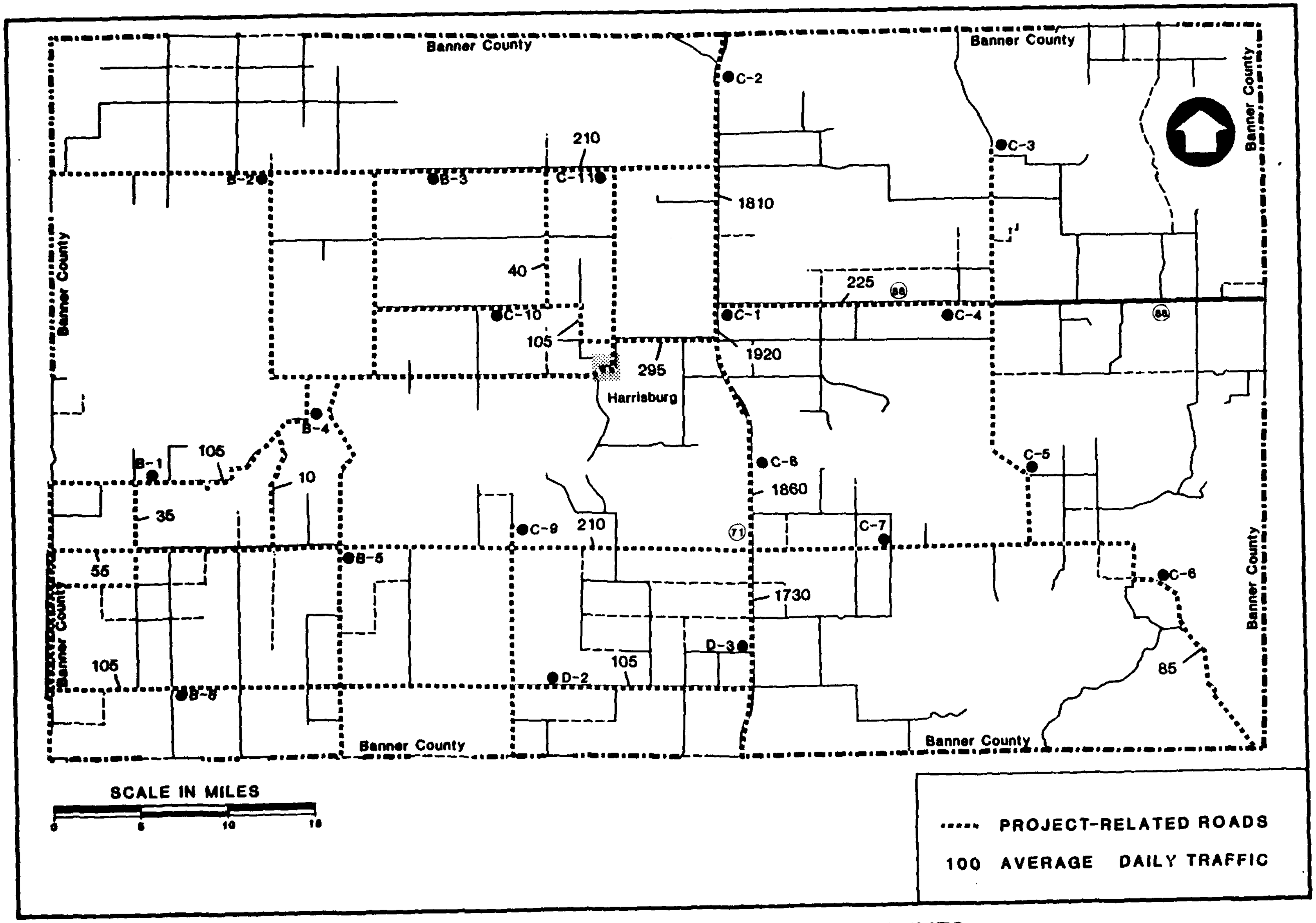


FIGURE 3.5.1-27 BANNER COUNTY - 1988-89 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

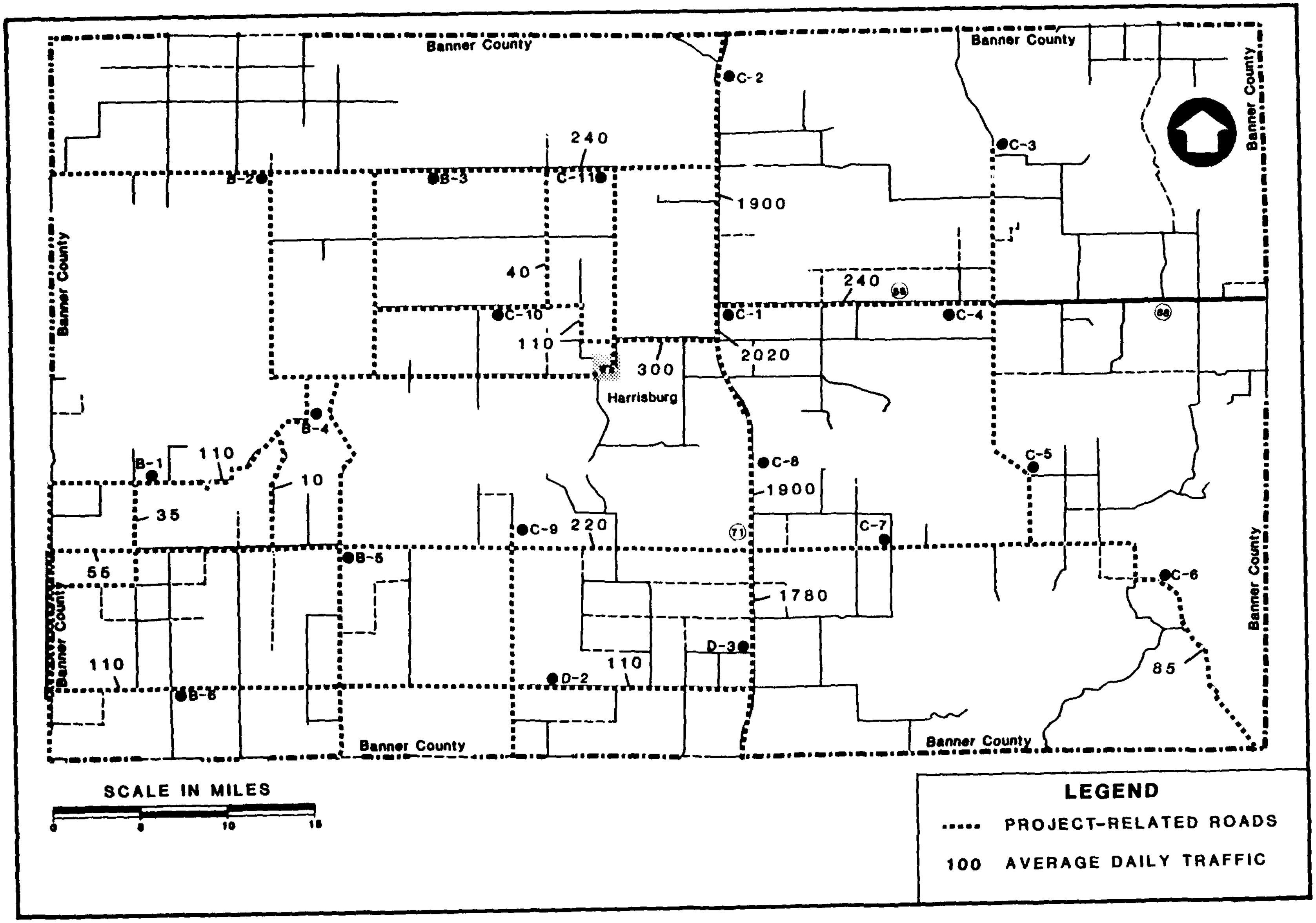


FIGURE 3.5.1-28 BANNER COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

Rural Interstates	3.0 percent
Rural State Highways	2.4 percent
County Roads	1.0 percent

From a capacity standpoint, all 1988 estimated baseline ADT volumes on project-related roads in the county would remain low and would be within the capacity of the existing roadways (Figure 3.5.1-29). For example, 1988 estimated baseline traffic volumes in the county would be 8,490 ADT for portions of U.S. 26, a figure below this roadway's capacity volume.

To estimate baseline ADT volumes in the county for the project operational phase, the average annual growth rates were applied to 1983 traffic volumes (Figure 3.5.1-30). Operational phase estimated ADT volumes for roadways within the county were within the capacity of those roadways to accommodate the increased volumes. For example, 1990 baseline ADT volumes on links of State Highway 71 would range from 2,260 to 3,210 or an increase of 360 and 510, respectively, over 1983 volumes. The highest 1990 estimated baseline ADT volume in the county would be 8,910 on portions of U.S. 26, still below this roadway's capacity. Baseline 1990 volumes on county roads would again fall far below the capacity of these roadways.

3.5.1.2.2 Proposed Action

The Proposed Action requires that existing T/E routes be able to accommodate the specifications of the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions provided by the road inventory and applicable project design standards. Table 3.5.1-1 shows basic roadway and structural deficiencies identified during this evaluation. It should be noted that the potential road and structural deficiencies identified in this report are being verified through an evaluation process by the MTMC, the FHWA, the Department of the Air Force, and the state and local transportation departments (see Appendix B).

T/E roadways must have adequate surface type and surface width. Preliminary results of the MTMC roadway evaluation study indicate that substantial roadway improvements will be necessary. Many miles of existing gravel roads will probably be paved, and existing paved roads may be reconstructed or resurfaced.

The road evaluation study developed preliminary surfacing options shown below to accommodate the Peacekeeper Project.

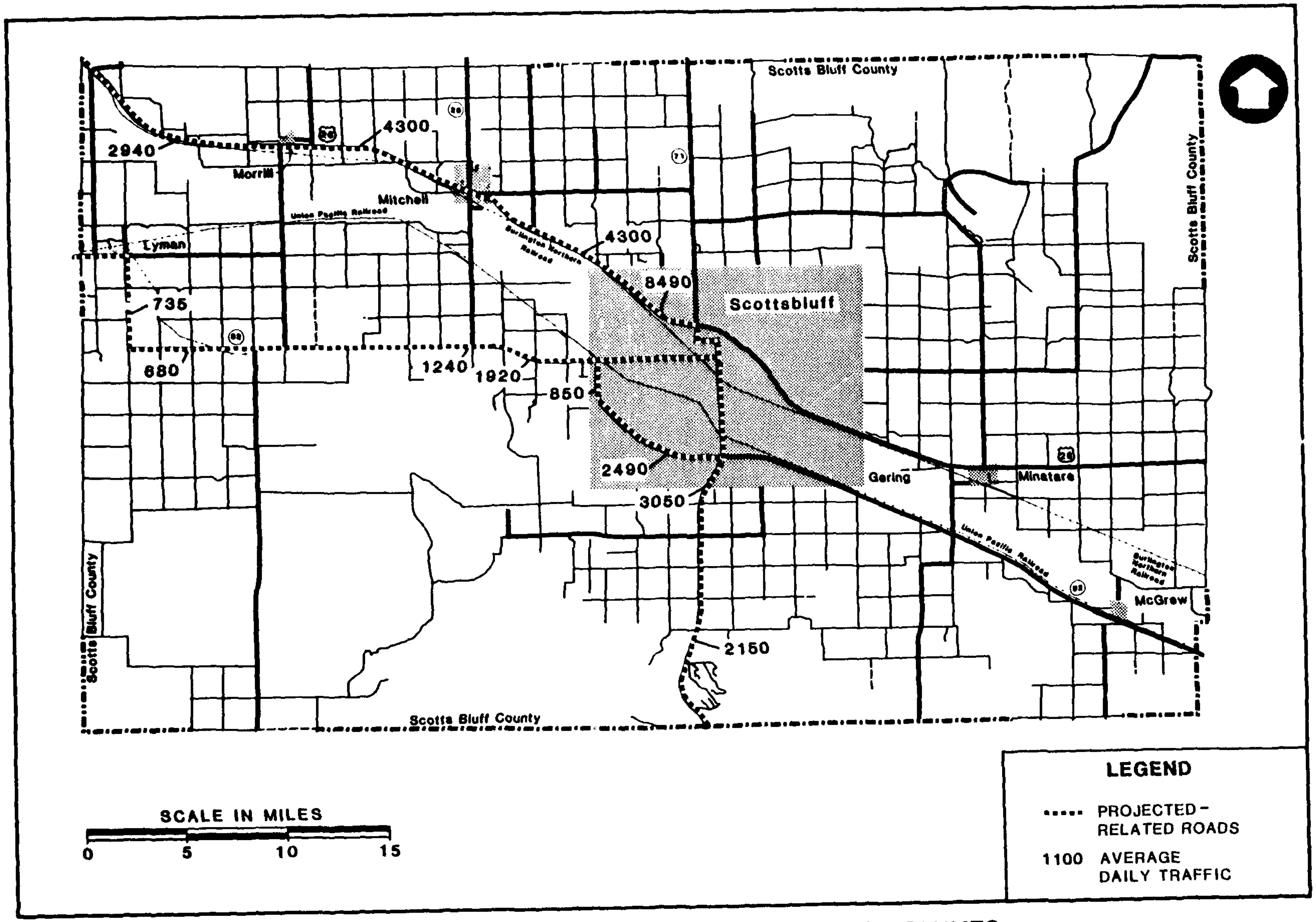


FIGURE 3.5.1-29 SCOTTS BLUFF COUNTY - 1988 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

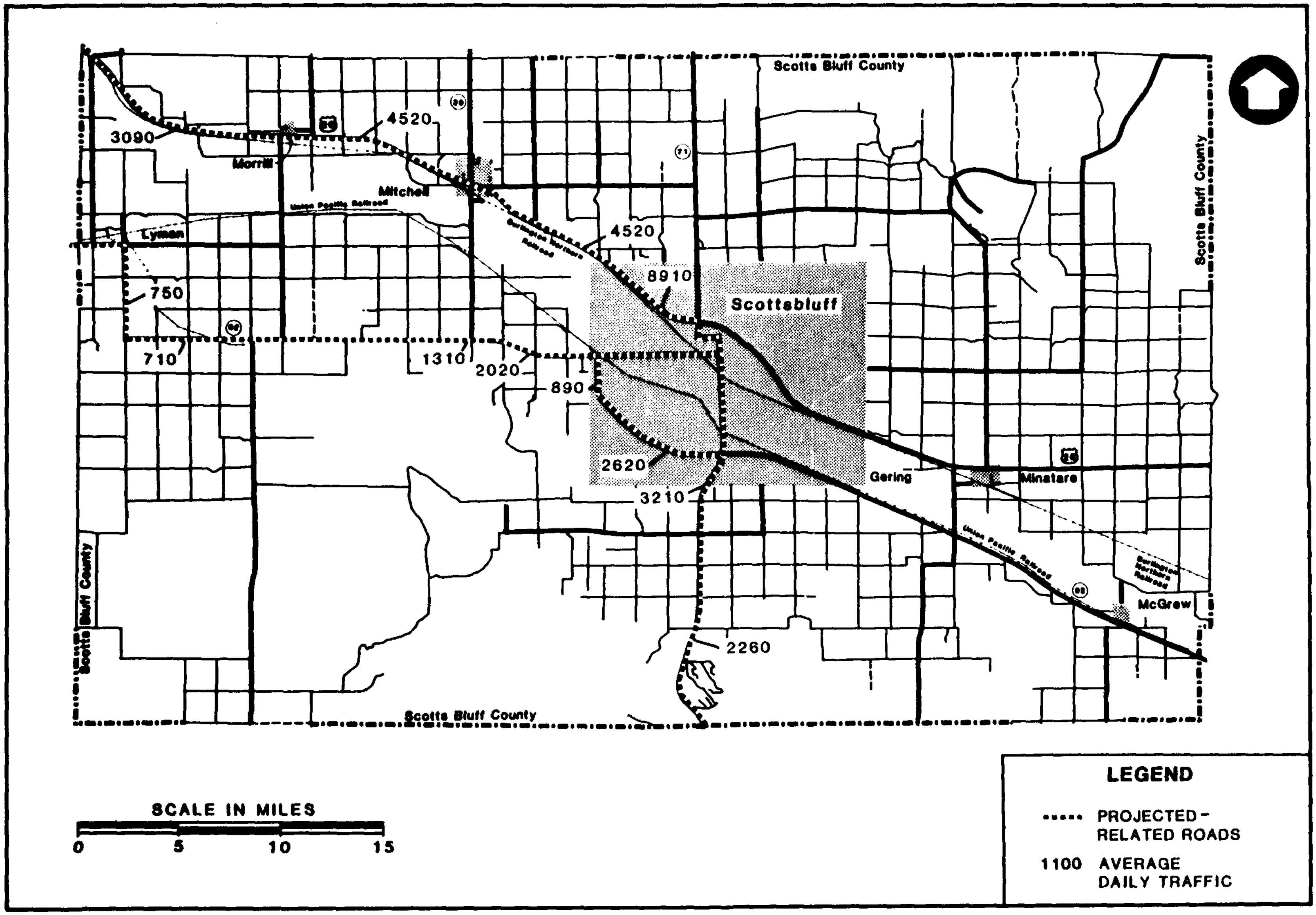


FIGURE 3.5.1-30 SCOTTS BLUFF COUNTY - 1990 PROJECTED TRAFFIC VOLUMES FOR THE NO ACTION ALTERNATIVE

Table 3.5.1-1

ALL COUNTIES
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
<18'	27.08
<20'	40.12
<24'	197.69
<26'	237.73
<28'	262.96
<30'	281.48
TOTAL MILES OF ROAD:	969.90[a]

Gravel Roadways

TOTAL MILES OF E-2 OR LESS: 306.83

Geometric Conditions

Substandard Curves[1] 62

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	157	No Standards
Reinforced Concrete Pipe	526	68
Corrugated Metal Pipe	1,077	352
Metal Pipe Arch	111	44
Other	0	No Standards
R.C. Arch Culverts	23	10

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to the thickness of material over the top of a culvert structure that acts to distribute the applied traffic loading.

a This figure includes mileage recorded on both sides (direction) of the Interstate System.

TRANSPORTER/ERECTOR ROUTE
SURFACING OPTIONS

	Option "A"		Option "B"	
STATE	Combination Aggregate & Asphalt Miles	Roadway Section	Miles	All Asphalt Roadway Section
WYOMING	75.29	40' wide; 6" aggregate plus 3" asphalt		Same as Option A
	106.57	32' wide; 6" aggregate plus 3" asphalt		Same as Option A
	17.90	32' wide; 3" asphalt		Same as Option A
	105.12	28' wide; 3" asphalt		Same as Option A
	145.11*	28' wide; 9" aggregate	181.39*	20' wide, 3" asphalt on 28'wide, 9" aggregate base
	36.28*	24' wide; 9" aggregate		
NEBRASKA	84.6*	22' wide; 7" asphalt		Same as other option
	71.2*	27' wide; 4" aggregate	71.2*	20' wide; 7" asphalt
	31.5	1" asphalt overlay on two 8' shoulders		Same as Option A

* Indicates currently a gravel-surfaced roadway.

The interstate highways, however, will remain unchanged except for improvements to structures, mainly culverts. In addition, the NDOR has recommended that seven links be removed from the T/E system and nine links added. The study also identified needed improvements to culverts and bridges.

Aggregate quantities determined from the Wyoming and Nebraska Highway proposals are expected to be maximum estimates. Option A would require 1,700,000 cubic yards of aggregate and 710,000 cubic yards of asphaltic concrete. Option B would require 1,380,000 cubic yards of aggregate and 1,050,000 cubic yards of asphaltic concrete. Man-hour requirements for roadway improvements are discussed in Appendix D. As recommended by the FHWA, careful consideration should be given to using existing gravel in place (see Appendix E).

Due to the quantities of materials involved, aggregate sources and additional roads utilized for hauls to the construction sites have been identified. These are illustrated in Figure 3.5.1-31 which is enclosed as a foldout at the end of the volume. The gravel pits are listed in Table 3.5.1-2 and the additional roads required as haul routes are described in Table 3.5.1-3.

Table 3.5.1-2

MATERIAL SOURCES BY COUNTY

Pit Number	Pit Name	Location and Description
LARAMIE COUNTY, WY		
L-1	Morris	NW¼ Sec. 18 T14N R67W
L-2	Child	NW¼ Sec. 6 T14N R65W
L-3	Child	Por. Sec. 5 T14N R65W
L-4	Hereford	Por. Sec. 32 T14N R65W
L-5	Fogg	Por. Sec. 9 T13N R65W
L-6	Miller	Por. Sec. 7 T13N R63W
L-7	Lang	SW¼ SE¼ Sec. 36 T13N R63W
L-8	Sanders	NE¼ Sec. 30 T14N R60W
L-9	Rohweder	NW¼ Sec. 19 T16N R61W
L-10	Goertz	Por. Sec. 35 T16N R64W
L-11	Goertz	N½ NW¼ SE¼ Sec. 34 T16N R64W
L-12	Warren Pole Creekpit	NW¼ Sec. 11 T15N R66W
L-13	Nimmo	S½ Sec. 2 T17N R67W
L-14	Warren Livestock	Por. Sec. 31 T18N R65W
L-15	Warren Livestock	Por. Sec. 36 T18N R65W
L-16	Kirkbride	SW¼ Sec. 28 T18N R64W
L-17	Krakow	NW¼ Sec. 8 T18N R63W
L-18	Petsch	N½ SE¼ Sec. 1 T18N R63W
L-19	Brown	W½ Sec. 8 T18N R62W
L-20	Bennett	Por. Sec. 23 T19N R67W
L-21	Dunmire	Por. Sec. 19 & 20 T19N R69W
PLATTE COUNTY, WY		
P-1	Burdette Pit	S½, NW¼ & N½ SW¼ Sec. 23 T20N R67W
P-2	Harding Pit	SE¼ Sec. 13 & NE¼ Sec. 24 T20N R67W
P-3	Burns	SE¼ NE¼ Sec. 31 T21N R66W
P-4	G-8 Pit	Por. Sec. 16 T21N R67W

Table 3.5.1-2 Continued
MATERIAL SOURCES BY COUNTY

Pit Number	Pit Name	Location and Description
P-5	T-Y-X	NW¼ NW¼ Sec. 9 T21N R66W
P-6	Goertz	S½ SE¼ Sec. 20 & N½ NE¼ Sec. 29 T22N R66W
P-7	Graves Pit	NE¼ Sec. 25 SE¼ Sec. 24 - T22N R67W
P-8	Artery Pit	NW¼ Sec. 24 T22N R67W
P-9	Finnerty Pit	N½ SE¼ Sec. 13 T22N R67W
P-10	Costopoulas	Por. Sec. 13 T22N R67W
P-11	Ray Charles	N½ NW¼ Sec. 35 T23N R68W
P-12	Buckles Pit #1	SW¼ SE¼ Sec. 2 & NW¼ NE¼ Sec. 12 T23N R68W
P-13	Buckles Pit #2	NE¼ SW¼ Sec. 1 T23N R68W
P-14	Weber Pit	5½ SW¼ Sec. 16 T24N R67W
P-15	May Pit	NE¼ SE¼ & SE¼ NE¼ Sec. 36 T23N R69W
P-16	Basin Pit No. 1	SW¼ SW¼ Sec. 21 T25N R67W
P-17	Johnson #2	SW¼ SW¼ Sec. 13 & NW¼ NW¼ Sec. 24 T25N R68W
P-18	Johnson #3	SE¼ NE¼ Sec. 14 & SW¼ NW¼ Sec. 13 T25N R68W
P-19	Fish Creek Pit #2	NE¼ Sec. 12 T25N R68W
P-20	Johnson Pit	N½ Sec. 12 T25N R68W
P-21	Fish Creek Pit #1	W½ SE¼ Sec. 34 T26N R68W
P-22	Fish Creek Pit #1	SE¼ SW¼ Sec. 34 T26N R68W
P-23	Fish Creek Pit #2	NW¼ NE¼ Sec. 28 T26N R68W
P-24	Fish Creek Pit #2	SW¼ SE¼ Sec. 21 T26N R68W
P-25	Fish Creek Pit #2	E½ SW¼ Sec. 21 T26N R68W
P-26	Costopoulas Stockpile	Sec. 5 & 6 T26N R65W
P-27	Crawford Pit #1	S½ SW¼ Sec. 31 T27N R65W
P-28	Costopoulas, Limestone Quarry	Sec. 27 T27N R66W
P-29	Guernsey Stone Co.	Sec. 23, 25, 26 T27N R66W
P-30	Rice Pit	NE¼ Sec. 36 T24N R68W

Table 3.5.1-2 Continued
MATERIAL SOURCES BY COUNTY

Pit Number	Pit Name	Location and Description
GOSHEN COUNTY, WY		
G-1	Johnson	NW¼ Sec. 36 T19N R61W
G-2	Johnson No. 1	SW¼ Sec. 30 T19N R60W
G-3	Johnson	Sec. 25 T19N R61W
G-4	Chamberlain	NW¼ Sec. 18 T19N R60W
G-5	Matze Pit #3	SW¼ Sec. 13 T19N R62W
G-6	Lovercheck	SW¼ NW¼ Sec. 20 T19N R62N
G-7	Yates	SE¼ NE¼ Sec. 4 T19N R63W
G-8	Sanders	SW¼ SW¼ Sec. 33 T20N R61W
G-9	Sherard	NW¼ SW¼ Sec. 33 T20N R61W
G-10	Gross-Willkinson	N½ SE¼ Sec. 32 T20N R61W
G-11	Costopoulas	SE¼ Sec. 32 T20N R61W
G-13	Schwab	SE¼ NW¼ Sec. 13 T21N R62W
G-14	Maxfield No. 2	NW¼ NE¼ Sec. 19 T22N R61W
G-15	Michael Pit	N½ SE¼ Sec. 13 T22N R62W
G-16	Maxfield No. 1	N½ Sec. 13 T22N R62W
G-17	Eaton Pit	Por. Sec. 32 T23N R63W
G-18	Coxbill Pit	N½ NW¼ & NW¼ NE¼ Sec. 4 T22N R61W
G-19	Clapp Pit	SE¼ SE¼ Sec. 32 T23N R61W
G-20	Goering	N½ Sec. 30 T24N R60W
G-21	Goering	N½ Sec. 25 T24N R61W
G-22	Loran Purtle Pit	Por. Sec. 24 T24N R61W
G-23	Roy Hendrickson Pit	SE¼ Sec. 15 T24N R61W
G-24	A.E. Olson-Shoemaker Pit	NE¼ NW¼ Sec. 20 T24N R61W
G-25	Ernst Pit (Willis Young)	NW¼, NW¼, SW¼ Sec. 16 T24N R61W
G-26	Holly Sugar	SW¼, NE¼, SE¼, NE¼ Sec. 16 T24N R61W
G-27	Holly Sugar	NE¼, SW¼ & NW¼, NE¼ Sec. 16 T24N R61W
G-28	Tebbett (Torrington Cement Products)	W½ SE¼ Sec. 4 T24N R61W
G-29	Matze Pit #2	SE¼ Sec. 14 T19N R62W

Table 3.5.1-2 Continued
MATERIAL SOURCES BY COUNTY

Pit Number	Pit Name	Location and Description
G-30	Kaufman #1	N½ NW¼ Sec. 17 T20N R61W
G-31	Titchner	SW¼ SW¼ Sec. 29 T25N R62W
G-32	Titchner	SE¼ SE¼ Sec. 30 T25N R62W
G-33	Walter Kapke	NW¼ SE¼ Sec. 30 T25N R62W
G-34	Costopoulas	SW¼ Sec. 13 T25N R63W
G-35	Costopoulas	NW¼ Sec. 14 T25N R63W
G-36	West	SW¼ NE¼ & N½ NW¼ SE¼ Sec. 17 T25N R62W
G-37	Jackson Pit	W½ NE¼ Sec. 17 T25N R62W
G-38	Costopoulas	S½ Sec. 8 T25N R62W
G-39	Jones	NE¼ SW¼ Sec. 8 T25N R62W
G-40	State Pit	N½ Sec. 14 T22N R61W
KIMBALL COUNTY, NE		
K-1	Margaret Mimkin	NE & SE¼ Sec. 8 T16N R58W
K-2	Ben King, Jr.	E½ Sec. 29 T15N R57W
K-3	Myrtle Chandler	Sec. 6 T14N R57W
K-4	Wayne Lukassen	Sec. 2 T15N R57W
K-5	Claude Morgan	NW¼ Sec. 24 T15N R56W
K-6	Douglas Elrod	Sec. 15 T12N R56W
K-7	Leo Lukassen	Sec. 13 T12N R56W
K-8	Art Hafeman	NW¼ Sec. 1 T14N R55W
K-9	DeLynn Peterson	SE¼ Sec. 9 T16N R54W
K-10	Margis Bowman	NE¼ Sec. 35 T16N R55W
K-11	Herbert Baack	NW¼ Sec. 31 T16N R53W
K-12	Ronald Jones	NE¼ Sec. 4 T15N R53W
K-13	Roy McIrvin	E½ Sec. 20 T15N R53W
K-14	Wayne Daum	NE¼ Sec. 22 T14N R54W

Table 3.5.1-2 Continued
MATERIAL SOURCES BY COUNTY

Pit Number	Pit Name	Location and Description
BANNER COUNTY, NE		
B-1	Keith Warner	E½ Sec. 22 T20N R57W
B-2	Robert Harvey	SE¼ NW¼ Sec. 22 T19N R57W
B-3	Mathews Ranches	NW¼ SW¼ Sec. 10 T19N R56W
B-4	Iler Olsen	NE¼ NW¼ Sec. 10 T19N R55W
B-5	Kirk O. Swearington	NE¼ NW¼ Sec. 8 T18N R57W
B-6	Kenneth Peterson	NW¼ Sec. 11 T18N R57W
B-7	Bill Woodhouse	SW¼ Sec. 25 T18N R56W
B-8	Albert Becker	NE¼ NE¼ Sec. 33 T18N R58W
B-9	Frank Darnall	SE¼ Sec. 4 T17N R57W
B-10	Ila Downer	SW¼ Sec. 23 T18N R56W
B-11	Bob Stauffer	S½ NW¼ Sec. 15 T18N R55W
B-12	Norman Brown	NE¼ SE¼ Sec. 10 T18N R54W
B-13	Carl Schnieder	SW¼ Sec. 23 T18N R53W
B-14	Floyd Soule	NW¼ Sec. 20 T17N R56W
B-15	Don Brown	W½ Sec. 31 T17N R55W
B-16	Harold Peterson	NE¼ Sec. 3 T17N R54W
B-17	Norman Johnson	SW¼ Sec. 14 T17N R53W
B-18	Melvin Knaub	S½ SE¼ Sec. 4 T19N R57W
B-19	Larry Stoddard	NE¼ NE¼ Sec. 16 T18N R55W

Table 3.5.1-3

AGGREGATE HAULAGE ROUTES

Link	Taken from County Road Maps Type of Surface	Scaled from Maps Length Miles
1001	Gravel Graded & Drained Road	3.2
1002	Paved Road, Low-Type Paved Road, High-Type	3.8 1.2
1003	Primitive Road	2.2
1005	Paved Road, Low-Type Gravel Graded & Drained	4.0 10.0
1006	Primitive Road	3.3
1007	Primitive Road	1.4
1008	Primitive Road	1.5
1009	Primitive Road	1.5
1010	Paved Road, Low-Type	2.0
1011	Improved Road	5.5
1012	Paved Road Graded & Drained	3.0 9.0
1013	Improved Road	13.0
1014	Improved Road	5.0
1015	Improved Road	3.0
1016	Primitive Road	5.0
1017	Graded & Drained Road	5.0
1018	Paved Road State Highway, Paved	4.5 2.2
1019	Graded & Drained State Highway, Paved	3.0 4.0
1020	Paved Road State Highway, Paved	1.2 8.0
1021	Graded & Drained Road	2.2
1023	Paved Road	11.0
1024	Gravel Graded & Drained (?)	13.0

Table 3.5.1-3 Continued
AGGREGATE HAULAGE ROUTES

Link	Taken from County Road Maps Type of Surface	Scaled from Maps Length Miles
1025	Gravel Graded & Drained	4.0
1026	Paved Road	4.0
1027	Paved Road	3.5
1028	Interstate 80	9.0
1029	Gravel Graded & Drained	4.0
1030	Gravel Graded & Drained	8.0
1031	Gravel Graded & Drained	13.0
1032	Gravel Graded & Drained	4.0
1033	Gravel Graded & Drained Paved (U.S. 30)	2.0 13.0
1034	Gravel Road	1.5
1035	Gravel Road	4.5
1036	Graded Road	1.0
1037	Gravel Road	1.5
1038	Gravel Road	3.5
1039	Gravel Road	6.0
1040	Gravel Road	8.5
1041	Gravel Road	8.0
1042	Gravel Road	2.0

Based on site visits and discussions with each of the six county engineers, officials from WHD, the NDOR and private agencies, the sources of aggregate were selected. Based on distance and road type, additional links required for hauling aggregate were assigned.

Additional truck traffic will be required to transport these construction materials. During the peak construction period, approximately 350 daily truck trips will be required over the six county areas. This traffic will be in addition to baseline truck traffic, which surveys show to be generally light except for the harvest period.

Construction activities to upgrade the T/E routes (including certain bridges) will have short-term, adverse impacts on the LOS, delays, and safety of many of the roads in the six counties involved. Level of service and safety impacts will be low and not significant. Delay impacts will be moderate and significant especially when coupled with agricultural traffic at harvest time. Construction activities at the Launch Facilities are expected to cause delays that will have low impacts that are not significant. Likewise, maintenance activities associated with other project-related roads will have short-term adverse impacts on motorist delays. These delay impacts will be low and not significant. Appendix C includes a discussion of maintenance activities associated with gravel roadways.

Overall, however, there will be a substantial long-term beneficial effect on the physical condition and safety of the T/E routes due to upgrading activities associated with the project.

Cable routing alternatives, including road crossings, are proposed. Short motorist delays at individual locations may be encountered. The cumulative impact of these delays at the Regional level will be negligible, and not significant.

The forecast increases in transportation activities, due to the dispatch station options, are low. For the Proposed Action, which includes Kimball and Chugwater, this will result in a low impact on roads that will not be significant.

3.5.1.2.2.1 Laramie County, Wyoming

Traffic volumes on project-related roads in Laramie County under the project were forecast for 1987, the county's peak project construction year. It is estimated that project-related traffic volumes during peak construction will be about 120 vehicles per day including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic level of service.

Project impacts upon the 1987 estimated ADT volumes on links of U.S. 85 within the county would range from 1,450 to 1,560, still below the minimum capacity for a 2-lane road (Figure 3.5.1-32). If the project were implemented, the highest 1987 estimated traffic volumes in the county would be 4,920 ADT which would occur on portions of Interstates 80 and 25. These volumes would also be below these roadways' capacity to accommodate maximum traffic volumes. For county roads, 1987 project-related traffic volumes are considerably less than the volumes identified above for Interstate and state highways.

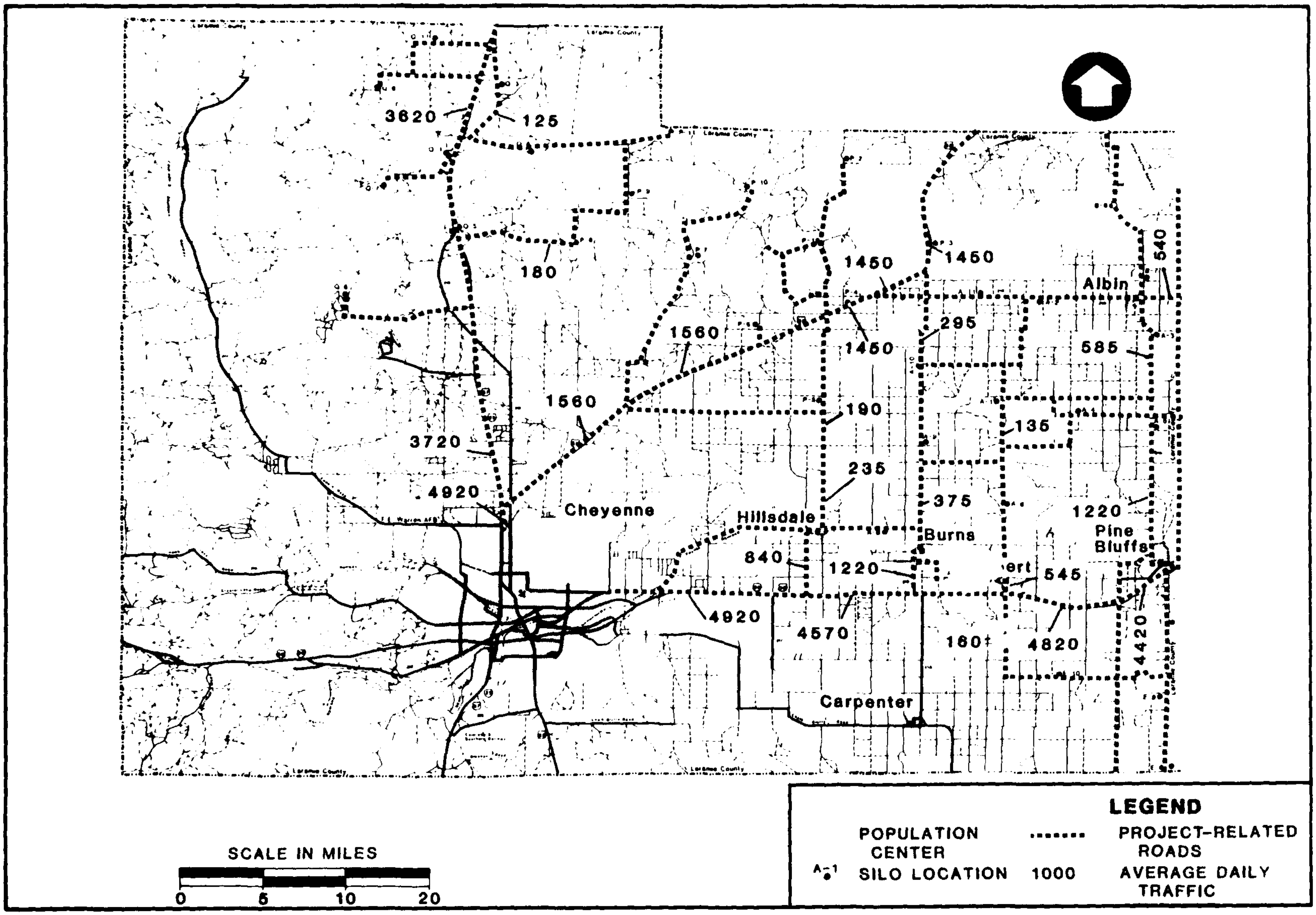


FIGURE 3.5.1-32 LARAMIE COUNTY - 1987 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

The T/E route network will be improved under the project in the years 1985 and 1986 during which time construction traffic will be at its heaviest. Additional truck traffic countywide is estimated at approximately 230 trucks per day in 1985 and 124 trucks per day in 1986. It is expected that this extra truck traffic, coupled with roadway construction activities, will cause moderate delay impacts that will be significant.

Based on available information, project-operational requirements will not generate substantially more traffic than is currently experienced for the Minuteman program. Any roadway impacts, based on additional Peacekeeper traffic, will be negligible and not significant.

The project requires that existing T/E routes be able to accommodate the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions and applicable project design standards. Table 3.5.1-4 lists basic roadway and structural deficiencies identified during this evaluation of physical condition.

It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation performed by the MTMC, the FHWA, the Department of the Air Force, and state and local transportation departments.

3.5.1.2.2.2 Platte County, Wyoming

Traffic volumes on project-related roads in Platte County were forecast for 1986, the county's peak project construction year. As previously discussed, it is estimated that project-related traffic volumes during peak construction will be about 120 vehicles per day including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic LOS.

Under the project, the 1986 estimated ADT volumes on links of Interstate 25 within the county would range from 3,520 to 3,720, still below the minimum capacity for a 4-lane road (Figure 3.5.1-33). If the project were implemented, the highest 1986 estimated traffic volumes in the county would be 3,720 ADT, which would occur on portions of Interstate 25. These volumes would also be below this roadway's capacity to accommodate maximum traffic volumes. For county roads, 1986 project-related traffic volumes are considerably less than the volumes identified above for Interstate highways.

The T/E route network will be improved under the project in the years 1985 and 1986, during which time construction traffic will be at its heaviest. Additional truck traffic countywide is estimated at 28 trucks per day in 1985 and 145 trucks per day in 1986. It is expected that this extra truck traffic, coupled with roadway construction activities, will cause moderate delay impacts that will be significant.

Based on available information, project-operational requirements will not generate substantially more traffic than is currently experienced for the Minuteman program. Any roadway impacts, based on additional Peacekeeper vehicle traffic, will be negligible and not significant.

Table 3.5.1-4

LARAMIE COUNTY
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
<18'	19.56
<20'	22.62
<24'	79.69
<26'	82.95
<28'	83.75
<30'	83.75

TOTAL MILES OF ROAD IN THIS COUNTY: 416.81[a]

Gravel Roadways

TOTAL MILES OF E-2 OR LESS: 102.28

Geometric Conditions

Substandard Curves[1] 16

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	24	No Standards
Reinforced Concrete Pipe	226	38
Corrugated Metal Pipe	498	161
Metal Pipe Arch	17	6
R.C. Arch Culverts	17	9

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to the thickness of material over the top of a culvert structure that acts to distribute the applied traffic loading.

a This figure includes mileage recorded on both sides (direction) of the Interstate System.

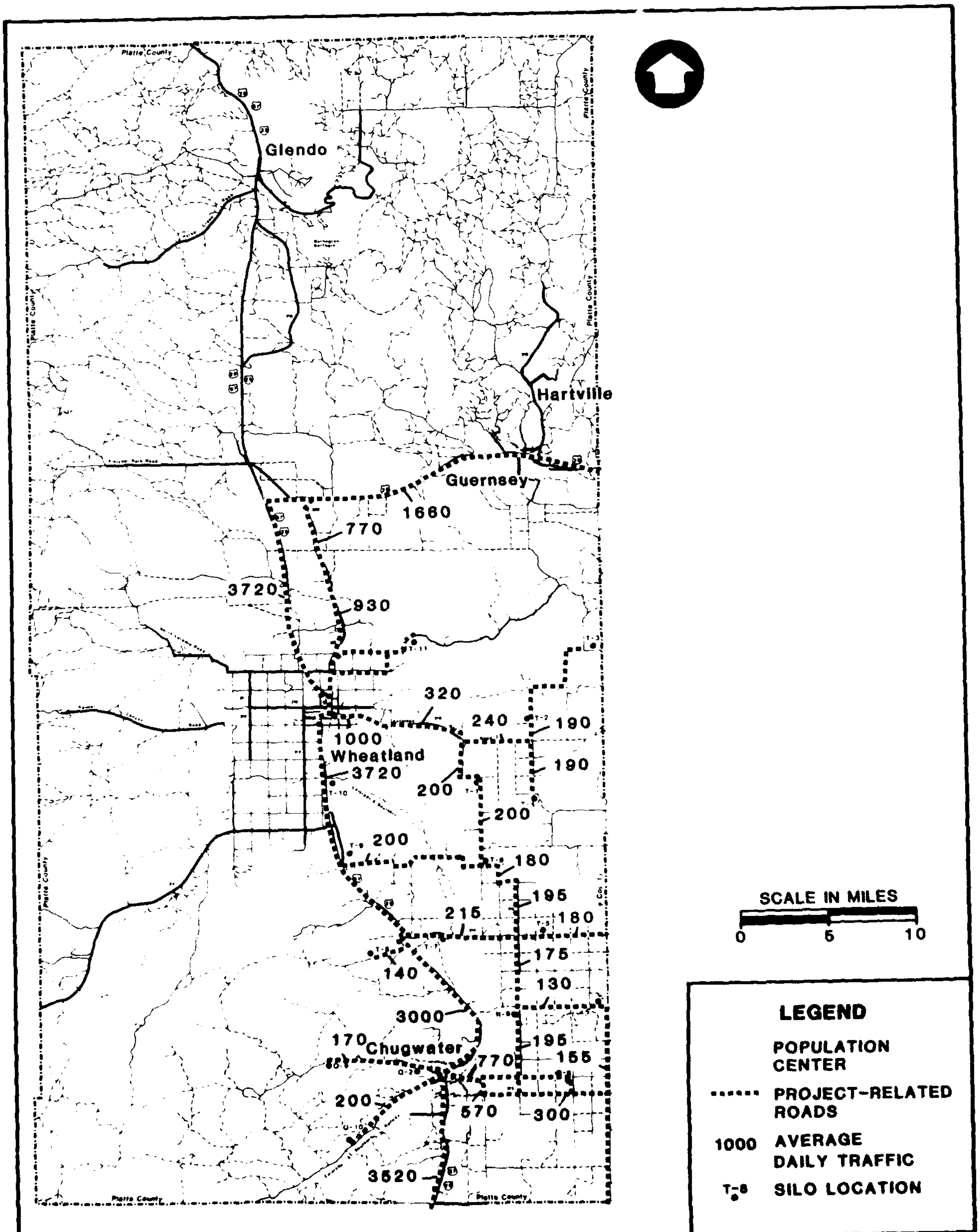


FIGURE 3.5.1-33 PLATTE COUNTY - 1986 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

The project requires that existing T/E routes be able to accommodate the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions and applicable project design standards.

It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation process by the MTMC, the FHWA, the Department of the Air Force, and the state and local transportation departments. Table 3.5.1-5 lists basic roadway and structural deficiencies identified during this evaluation.

3.5.1.2.2.3 Goshen County, Wyoming

Traffic volumes from the project on project-related roads in Goshen County were projected for 1988, the county's peak project construction year. As previously discussed, it is estimated that project-related traffic volumes during peak construction will be about 120 vehicles per day including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic LOS.

Under the project, the 1988 estimated ADT volumes on links of U.S. 85 within the county would range from 1,560 to 2,950, still below the minimum capacity for a 2-lane road (Figure 3.5.1-34). If the project were implemented, the highest 1988 estimated traffic volumes in the county would be 5,448 ADT which would occur on portions of U.S. 26 and 85. These volumes would also be below these roadways' capacities to accommodate maximum traffic volumes. For county roads, 1988 traffic volumes under the project are considerably less than the volumes identified above for U.S. routes.

The T/E route network will be improved under the project in the years 1986 and 1987 during which time construction traffic will be at its heaviest. Additional truck traffic countywide is estimated at approximately 43 trucks per day in 1986 and 115 trucks per day in 1987. It is expected that this extra truck traffic, coupled with roadway construction activities, will cause moderate delay impacts that will be significant.

Based on available information, project-operational requirements will not generate substantially more traffic than is currently experienced for the Minuteman program. Any roadway impacts, based on additional Peacekeeper vehicle traffic, will be negligible and not significant.

The project requires that existing T/E routes be able to accommodate the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions and applicable project design standards. Table 3.5.1-6 lists basic roadway and structural deficiencies identified during this evaluation of physical condition.

It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation process by the MTMC, FHWA, the Department of the Air Force, and the state and local transportation departments.

Table 3.5.1-5

PLATTE COUNTY
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
<18'	0.31
<20'	0.96
<24'	20.03
<26'	23.43
<28'	25.31
<30'	26.27
TOTAL MILES OF ROAD IN THIS COUNTY:	169.60[a]

Gravel Roadways

TOTAL MILES OF E-2 OR LESS	32.72

Geometric Conditions

Substandard Curves[1]	26

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	14	No Standards
Reinforced Concrete Pipe	125	19
Corrugated Metal Pipe	226	83
Metal Pipe Arch	9	5
R.C. Arch Culverts	5	1

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to the thickness of material over the top of a culvert that acts to distribute the applied traffic loading.

a This figure includes mileage recorded on both sides (direction) of the Interstate System.

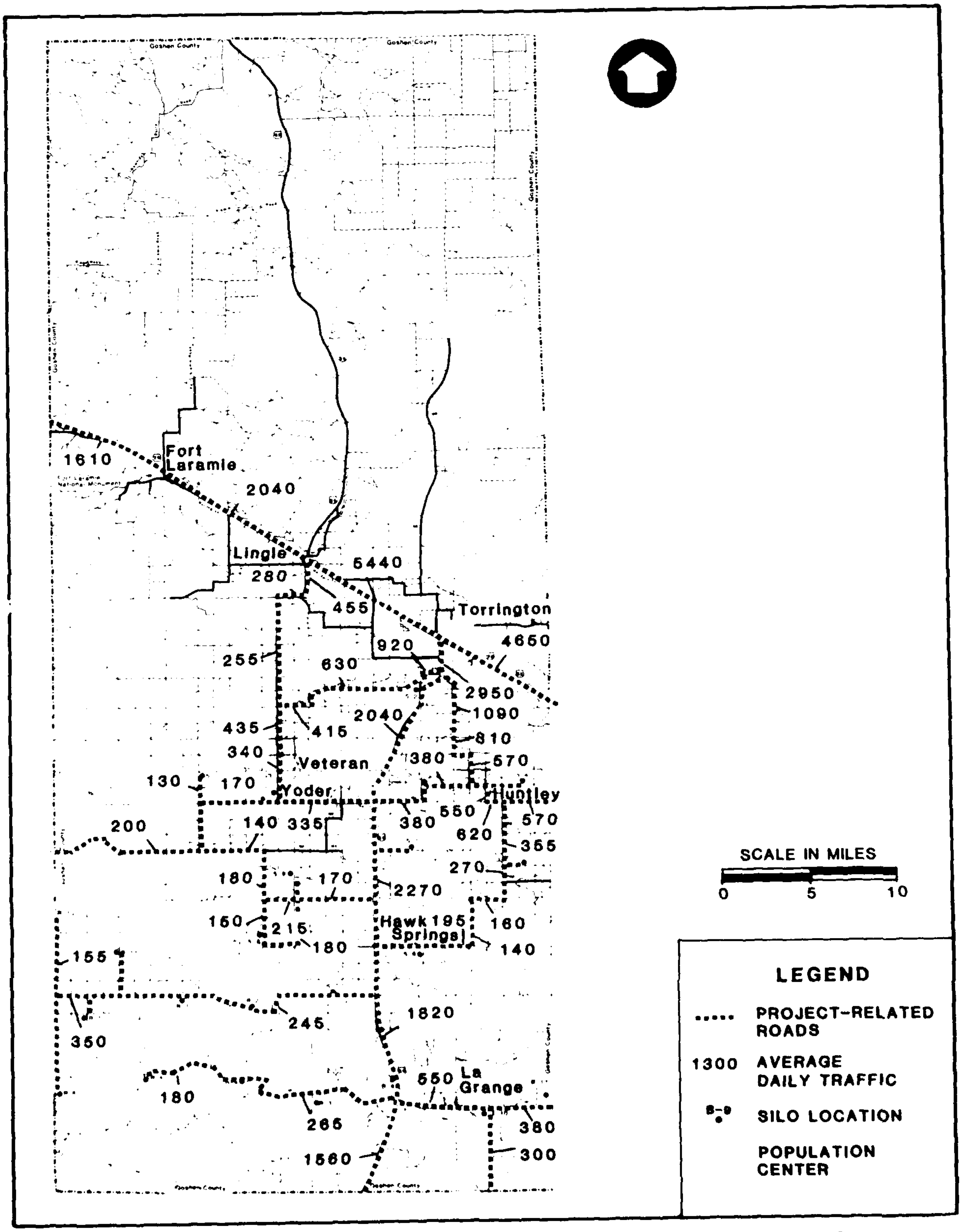


FIGURE 3.5.1-34 GOSHEN COUNTY - 1988 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

Table 3.5.1-6

GOSHEN COUNTY
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
<18'	5.22
<20'	11.01
<24'	35.88
<26'	39.02
<28'	44.52
<30'	44.52

TOTAL MILES OF ROAD IN THIS COUNTY: 138.99

Gravel Roadways

TOTAL MILES OF E-2 OR LESS: 44.52

Geometric Conditions

Substandard Curves[1] 18

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	15	No Standards
Reinforced Concrete Pipe	57	6
Corrugated Metal Pipe	157	39
Metal Pipe Arch	12	0
R.C. Arch Culverts	0	0

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to material over the top of a culvert that acts to distribute the applied traffic loading.

3.5.1.2.2.4 Kimball County, Nebraska

Traffic volumes on project-related roads in Kimball County under the project were forecast for 1989, the county's peak project construction year. As previously discussed, it is estimated that project-related traffic volumes will be about 120 vehicles per day during peak construction, including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic LOS.

Under the project, the 1989 estimated ADT volumes on links of State Highway 71 within the county would range from 2,090 to 2,670, still below the minimum capacity for a 2-lane road (Figure 3.5.1-35). If the project were implemented, the highest 1989 estimated traffic volumes in the county would be 5,020 ADT which would occur on portions of Interstate 80. This volume would also be below the roadway's capacity to accommodate maximum traffic volumes. For county roads, 1989 traffic volumes under the project are considerably less than the volumes identified above for Interstate and state highways.

The T/E route network will be improved under the project in the year 1987 during which time construction traffic will be at its heaviest. Countywide, additional truck traffic is estimated at approximately 60 trucks per day during this year. It is expected that this extra truck traffic, coupled with roadway construction activities, will cause moderate delay impacts that will be significant.

Based on available information, project-operational requirements will not generate substantially more traffic than is currently experienced for the Minuteman program. Any roadway impacts, based on additional Peacekeeper vehicle traffic, will be negligible and not significant.

The Kimball railroad bridge over Nebraska State Highway 71 presently has a clearance of only 13 feet, 6 inches. Alternative routes exist to preclude the necessity of substantial and impractical changes to the existing railroad overpass. These include:

- Use of the existing county road in Banner County between LF B-5 and Route 71, adding about 12 miles of roads to the Defense Access Road (DAR) system;
- Use of the existing county road in Banner County between LF B-6, D-2, and Route 71 adding about 16 miles of roads to the DAR system; and
- Use of the existing county road 2 miles west of Route 71 on Route 30 across an existing railroad at-grade and proceeding 1 mile north, then 2 miles east to Route 71 which will require improvement of the at-grade railroad crossing. This adds about 3 miles of roads to the DAR system. This is the Proposed Action.

In addition to the mileage added by each alternative to the DAR system, the first two alternatives involve a more circuitous travel route, thus generating more vehicle-miles of travel for S/T operations. The last alternative will require the least amount of upgrade and the least impact on the whole DAR system.

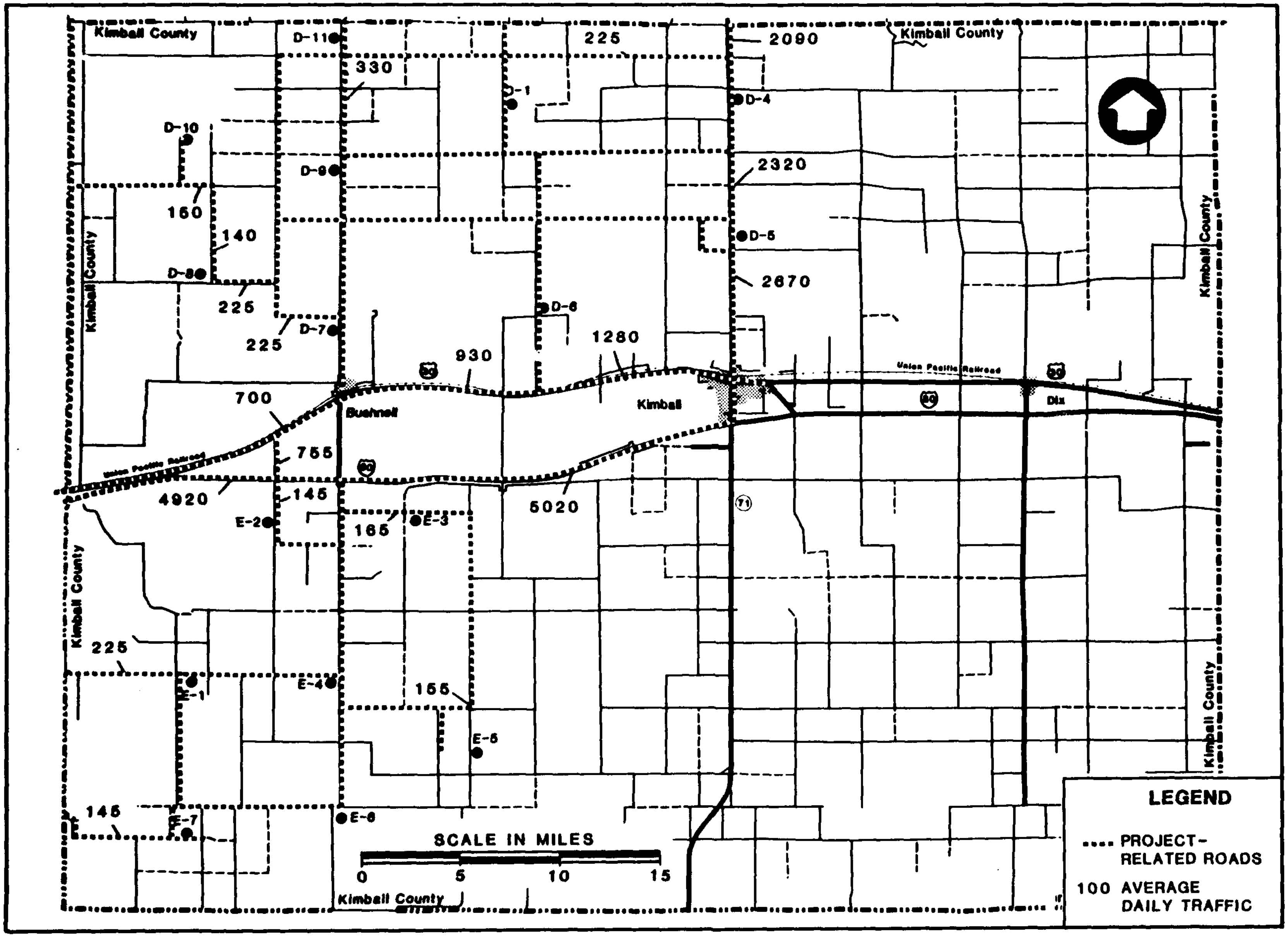


FIGURE 3.5.1-35 KIMBALL COUNTY - 1989 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

The project requires that existing T/E routes be able to accommodate the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions and applicable project design standards.

County and State Highway departments have proposed a number of changes to the present T/E network; these changes involve additions to and deletions from the network as shown in Figure 3.5.1-35. The total road length added is approximately 7.5 miles; that deleted is approximately 4.5 miles.

It should be noted that potential road and structural deficiencies identified in this report will be verified by the MTMC, FHWA, the Department of the Air Force, and the state and local transportation departments. Table 3.5.1-7 lists basic roadway and structural deficiencies identified during this evaluation of physical condition.

3.5.1.2.2.5 Banner County, Nebraska

Traffic volumes on project-related roads in Banner County under the project were forecast for 1988 and 1989, the county's peak project construction years. As previously discussed, it is estimated that project-related traffic volumes during peak construction will be about 120 vehicles per day including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic LOS.

Project impacts upon the 1988 and 1989 estimated ADT volumes on links of State Highway 71 within the county would range from 1,850 to 2,040, still below the minimum capacity for a 2-lane road (Figure 3.5.1-36). The 2,040 volume quoted above also represents the highest 1988 and 1989 estimated traffic volume in the county. This volume would be below this roadway's capacity to accommodate maximum traffic volumes. For county roads, 1988 and 1989 traffic volumes under the project are considerably less than the volumes identified above for state highways.

The T/E route network will be improved under the project in the year 1987 when construction traffic will be at its heaviest. Additional truck traffic, countywide, is estimated at approximately 90 trucks per day for this year. It is expected that this extra truck traffic, coupled with roadway construction activities, will cause moderate delay impacts that will be significant.

Based on available information, project-operational requirements will not generate substantially more traffic than is currently experienced for the Minuteman program. Any roadway impacts, based on additional Peacekeeper vehicle traffic, will be negligible and not significant.

The project requires that existing T/E routes be able to accommodate the S/T vehicle. Projected roadway deficiencies on T/E routes were assessed through an evaluation of existing roadway conditions and applicable project design standards.

County and State Highway departments have proposed a number of changes to the present T/E network improving link continuity and using better roads where possible. These changes, involving additions to and deletions from the net-

Table 3.5.1-7

KIMBALL COUNTY
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
< 18'	0.00
< 20'	0.03
< 24'	20.08
< 26'	43.29
< 28'	60.34
< 30'	62.28
TOTAL MILES OF ROAD IN THIS COUNTY:	142.60[a]

Gravel Roadways

TOTAL MILES OF E-2 OR LESS:	62.65

Geometric Conditions

Substandard Curves[1]	1

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	87	No Standards
Reinforced Concrete Pipe	118	5
Corrugated Metal Pipe	84	31
Metal Pipe Arch	41	18
R.C. Arch Culverts	1	0

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to the thickness of material that acts to distribute the applied traffic loading.

a This figure includes mileage recorded on both sides (direction) of the Interstate System.

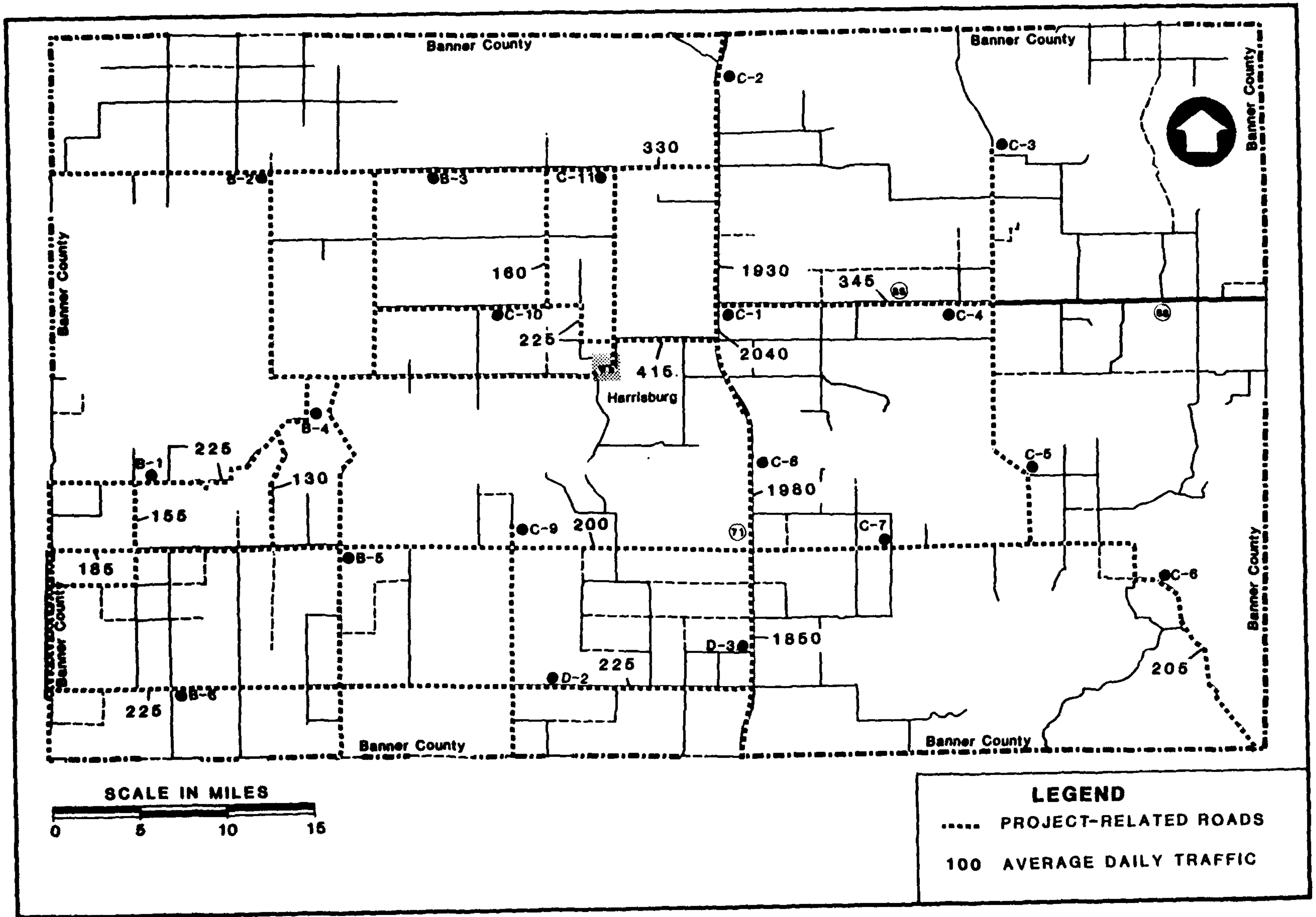


FIGURE 3.5.1-36 BANNER COUNTY - 1988-89 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

work, are shown in Figure 3.5.1-36. The total mileage added is approximately 28.5 miles while approximately 15 miles is deleted.

It should be noted that the potential road and structural deficiencies identified in this report will be verified through an evaluation process by the MTMC, the FHWA, the Department of the Air Force, and the state and local transportation departments. Table 3.5.1-8 lists basic roadway and structural deficiencies identified during this evaluation of physical condition.

3.5.1.2.2.6 Scotts Bluff County, Nebraska

Traffic volumes on project-related roads in Scotts Bluff County were forecast for 1988, the county's peak project construction year. As previously discussed, it is estimated that project-related traffic volumes during peak construction will be about 120 vehicles per day including about 20 heavy trucks. While this represents a substantial daily traffic increase on the rural road system, the resulting traffic volumes would have a negligible impact on traffic LOS that would not be significant.

Under the project, the 1988 estimated ADT volumes on links of State Highway 71 within the county would range from 2,270 to 3,170, still well below the minimum capacity for a 2-lane road (Figure 3.5.1-37). If the project were implemented, the highest 1988 estimated traffic volumes in the county would be 8,610 ADT which would occur on portions of U.S. 26. This volume would also be below the roadway's capacity to accommodate maximum traffic volumes. For county roads, 1988 project-related traffic volumes are below those identified for U.S. routes and state highways.

3.5.2 Railroads

3.5.2.1 Baseline Future - No Action Alternative

Future trends in mainline shipments through the study area will depend on the general economic conditions and competition among the other transcontinental modes of travel.

Based on recent trends and discussions with rail officials, it can be assumed that rail activity on the system as it presently exists would remain reasonably stable and within existing capacity.

One project that will affect the existing system is a coal rail line in eastern Wyoming extending into Nebraska. Chicago and North Western Transportation Company (C&NW) and Burlington Northern (BN) are planning a new rail line to serve an area of coal production in Campbell and Converse counties, Wyoming. This project consists of construction of a 106-mile rail line from the area of coal production to C&NW's existing line at Shawnee, Wyoming, and to BN's existing line at Orin, Wyoming; rehabilitation of 45 miles of the existing C&NW branch line east of Shawnee; construction of a 56-mile long connection to the Union Pacific's existing North Platte Branch and construction of various maintenance and operating facilities including over one million square feet of repair and storage facilities in Morrill, Nebraska. C&NW estimates that the line will reach an operational plateau in 1991 of approximately 40.3 million tons per year of coal with an average of 12 trains per day in each direction.

Table 3.5.1-8

BANNER COUNTY
COMPARISON OF EXISTING CONDITIONS
WITH VARIOUS DESIGN STANDARDS

All Roads

Width	Mileage
< 18'	1.99
< 20'	5.50
< 24'	42.01
< 26'	49.04
< 28'	49.04
< 30'	64.66
TOTAL MILES OF ROAD IN THIS COUNTY:	101.90

Gravel Roadways

TOTAL MILES OF E-2 OR LESS: 64.66

Geometric Conditions

Substandard Curves[1] 1

Culverts

Type	Total Number	Number With Deficient Cover[2]
Box Culverts	17	No Standards
Reinforced Concrete Pipe	0	0
Corrugated Metal Pipe	112	38
Metal Pipe Arch	32	15
R.C. Arch Culverts	0	0

Note: 1 Substandard curves - curves that would be unable to accommodate the required turning radius of the stage transporter vehicle.

2 Cover refers to the thickness of material over the top of a culvert that acts to distribute the applied traffic loading.

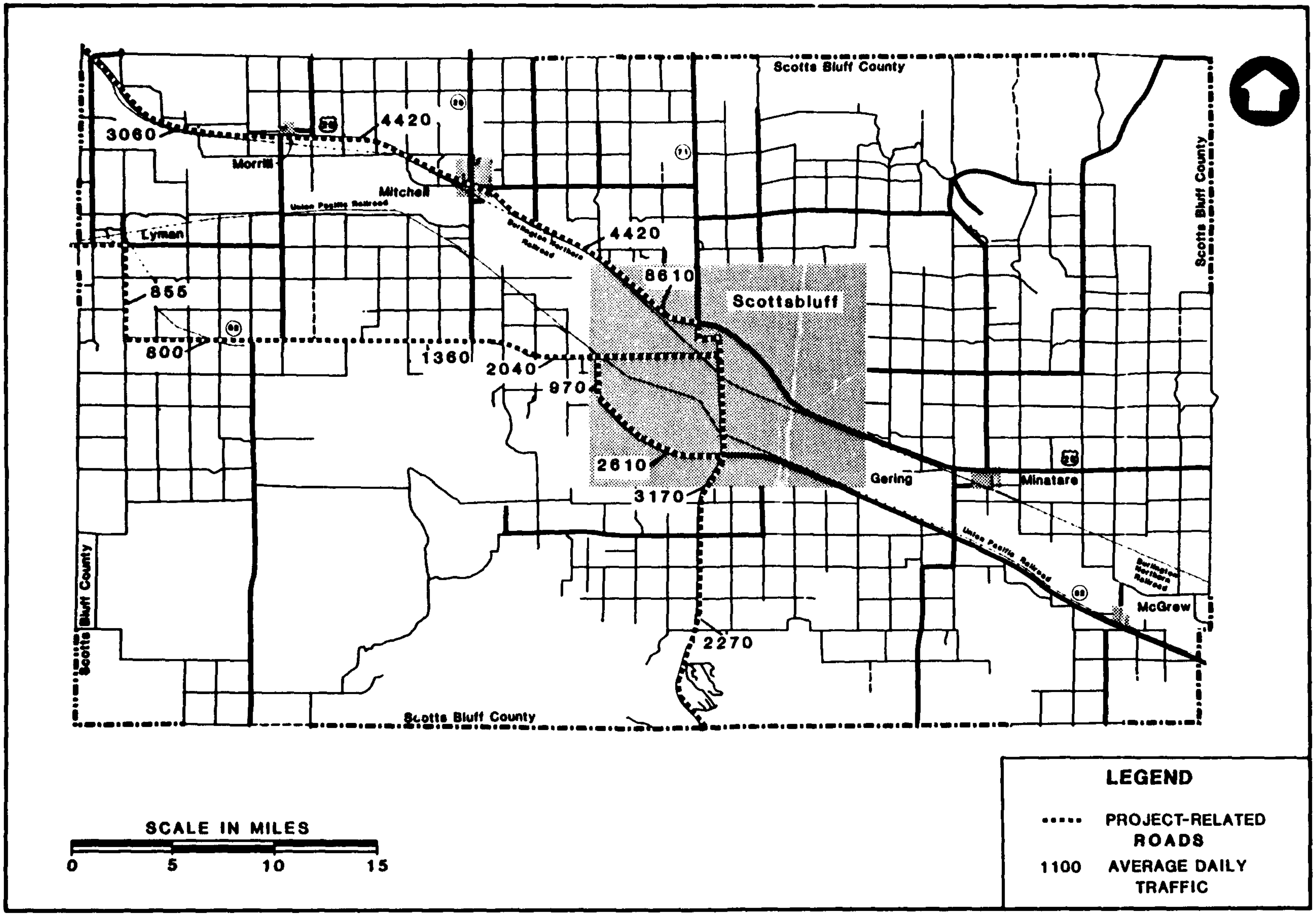


FIGURE 3.5.1-37 SCOTTS BLUFF COUNTY - 1988 PROJECTED TRAFFIC VOLUMES FOR THE PROPOSED ACTION

It is difficult to analyze shipments to and from Cheyenne because of a lack of data on the existing traffic originating and terminating there. However, based on limited data, anticipated growth should remain well within existing capacity.

3.5.2.2 Proposed Action

Project-related impacts are difficult to predict, as the actual distribution of materials to be delivered by rail or truck cannot be determined.

Based on discussions with rail officials, the existing rail system is under capacity and could handle added shipments related to the project.

With numerous sidings throughout the area, it is possible that some of these sidings could be used as rail delivery points for project materials, then distributed to trucks for the various silo sites and roadway construction segments. These sidings again are underused and should be capable of handling these possible transfers using temporary equipment or facilities.

The primary impact on the rail yard in Cheyenne would occur during 1985 when the construction peak occurs at F.E. Warren AFB. Additional operations would be the result of material being switched at Cheyenne for further rail distribution to the base or silo sites and the shipment of missile components from the manufacturer to the base.

The existing rail system is operating under capacity and could handle added shipments related to the project. At the Cheyenne rail yard, any foreseeable effect on its operating capacity can be readily handled. This will constitute a negligible level of impact and not be significant. From discussions with rail officials, any foreseeable project-related increases should be readily accommodated.

During project construction at F.E. Warren AFB, it is expected that the level of rail traffic to support the construction activity at the base will increase slightly by approximately one train per week, resulting in low impact which will not be significant at the at-grade rail and road crossings within Cheyenne. The crossings affected are:

- Colorado Southern Railway with College Drive east of Interstate 25; and
- BN Railway with West Lincolnway, 19th Street, 20th Street, and 24th Street.

3.5.3 Aviation

3.5.3.1 Baseline Future - No Action Alternative

3.5.3.1.1 Cheyenne Airport

3.5.3.1.1.1 Historical Perspective

Cheyenne Airport has seen large variations in air traffic over the years due to a number of factors. Some of them can be briefly summarized as follows:

- o Military construction associated with the Atlas and Minuteman programs.
- o Up through the early 1960s, Cheyenne was considered a regional center (United Airlines had headquartered some of its operations in Cheyenne). However, Denver has replaced Cheyenne as the main regional center.
- o Because of Cheyenne's close proximity to Denver, many potential passengers drive to Denver rather than fly.
- o Recent developments have contributed to a decline in air traffic at Cheyenne including the air traffic controllers' strike, the recession, a scarcity of aviation fuel in 1981, high fuel prices, and high interest rates. (These latter two factors tend to reduce general aviation traffic).
- o Even more recently, Frontier Airlines, Frontier Commuter, and Rocky Mountain Airways revised their fare structure to allow a combined fare (i.e., this essentially reduced the cost of the Cheyenne-to-Denver leg of a trip). Consequently, the first half of 1983 showed a large increase in revenue passengers. Assuming this trend continued throughout 1983, the number of enplaning passengers increased from approximately 25,900 in 1982 to approximately 33,000 in 1983.

This trend would seem to be continuing in the short-term future with recent developments as follows:

- o Frontier Airlines revised its service pattern and determined that its jets were better used on longer haul service. Frontier ceased jet service to Cheyenne in the fall of 1983.
- o Frontier Commuter provided replacement service using 50-passenger Convair 580 turbo-props. Initial service consisted of three round-trips daily to Cheyenne.
- o The Air Force has requested the additional leasing of 5 acres of airport property for the construction of a temporary building for additional storage spaces for its LOGAIR cargo and Transient Alert operations. Long-range plans call for the construction of a permanent facility.

- Frontier Services, a related corporate entity of Frontier Airlines, operates an airframe and powerplant mechanics' school at the airport which opened in September 1983. The school enrollment is expected to increase over the first year to a total of 330 students. Traditionally, 20 to 30 percent of these students take pilot instructions at the same time. This could add 65 to 100 students to the instruction operations of the two fixed base operators. Based on the average student flying twice a week, this could potentially add 6,500 to 10,000 operations per year at Cheyenne.

The variability in the air transportation market for Cheyenne should be considered as one of its main features. The seemingly elastic demand for passenger traffic can result in large changes in the number of passengers traveling by air to Denver, the principal city serving Cheyenne, due to small changes in the fare structure. In the long run, the fare structure will depend upon the competitive nature of the Cheyenne market. The Cheyenne-Denver market is characterized by two types of passengers: local and interline passengers. The interline passengers, based upon discussions with the air carriers, are estimated to be approximately 80 percent of the market. The low percentage of local passengers is not surprising, since the driving-travel time between Denver and Cheyenne is 2 hours and most passengers, upon arriving in either city, require a car. Seasonal peaks occur in the months of July and August. Traffic drops off in the winter months with the lows generally occurring in December.

In Wyoming, Casper has more air passenger traffic than Cheyenne. This can be explained by Casper's more remote location and the energy-related activities occurring in that region.

3.5.3.1.1.2 Forecast

Air passenger traffic activity at Cheyenne made a marked recovery during 1983 due to the change in the fare structure as discussed above and from the general economic recovery. Long-term trends will depend upon continued competitive fares, lower fuel prices, low interest rates, and improved national and regional economics. In the long run, the single most significant factor in the determination of air passenger travel is the increase in real personal income, provided that there is no drastic change in the fare structure and in aviation technology. Both of these factors are assumed to remain unchanged over the forecast period. Real personal income is expected to increase in Cheyenne and its neighboring areas at about 6.67 percent per year between 1983 and 1990. The forecasts of passenger enplanements are given in Table 3.5.3-1.

Turbo operations for 1983 are based on data collected for the first half of the year and planned flight schedules of Frontier Airlines, Frontier Commuter, and Rocky Mountain Airways through the remainder of that year. The discontinuation of jet service to Cheyenne resulted in a large increase in turbo operations as replacement service.

Anticipated schedules for Frontier Commuter and Rocky Mountain Airways form the basis for 1984 turbo operations, and an annual growth rate of 5 percent is assumed thereafter. The difference in growth rates between passenger traffic (6.67%) and operations (5%) accounts for a gradually increasing load factor.

Table 3.5.3-1

AIR TRAFFIC FORECASTS AT CHEYENNE (BASELINE PROJECTIONS)

Year	Total Enplaning Passengers	Commercial Jet Operations	Commercial Turbo Operations	Total Commercial Operations	Jet General Aviation (25% of GA)	General Aviation	Military Operations	Total Jet Operations (3+6)	Total Operations (5+7+8)	Peak Monthly	Daily Peak	Hourly Peak
1983	32,700	1,170	4,730	5,900	13,182	52,730	16,194	14,352	74,824	8,293	498	60
1984	34,891	130	12,240	12,370	14,066	56,263	16,356	14,196	84,989	9,420	565	68
1985	37,229	136	12,852	12,988	15,008	60,033	16,520	15,144	89,541	9,924	595	71
1986	39,723	143	13,495	13,638	16,014	64,055	16,685	16,157	94,378	10,460	628	75
1987	42,384	150	14,170	14,320	17,087	68,346	16,852	17,237	99,518	11,030	662	79
1988	45,224	158	14,878	15,036	18,232	72,926	17,020	18,390	104,982	11,635	698	84
1989	48,254	166	15,622	15,788	19,453	77,812	17,190	19,619	110,790	12 279	737	88
1990	51,487	174	16,403	16,577	20,756	83,025	17,362	20,930	116,964	12,963	778	93

Jet operations drop off from 1983 due to the discontinuation of jet service by Frontier Airlines. A 1-percent growth in jet traffic is assumed thereafter based on corporate and charter operations.

General aviation is expected to follow the same trend as passenger traffic since it is also dependent on increases in real personal income.

The drop in interest rates and fuel prices will probably result in large increases in general aviation traffic in 1984; however, overall the growth rate should approximate the increase in real personal income.

Military traffic is expected to show a small increase in traffic over the coming years; a 1-percent growth rate reflecting an expansion of the Air National Guard operations at Cheyenne is assumed.

The air traffic forecasts at Cheyenne for the base case are [illegible] in Table 3.5.3-1. The peak operations were estimated on the basis of the peak monthly value (1.33 of the average monthly) which occurs in July, and on the peak daily value which is estimated from historic data to be 6 percent of the monthly average. The hourly peak is taken to be 12 percent of the peak daily value. Ashford and Wright Airport Engineering - 1979 indicate a value of 12 to 15 percent for an aircraft mix of between 50 to 70 percent small aircraft.

3.5.3.1.1.3 Capacity Analysis

Runway Capacity. Runway capacity is defined as the ability of the runway system to accommodate aircraft landings and takeoffs and is the measurement of the numbers of operations (takeoff or landings) per unit of time. In the Master Plan of Cheyenne Airport, a detailed analysis of runway capacity was made. The criteria used in this analysis are still valid today; they are as follows:

- Visual Flight Regulations (VFR) departures - Three minutes average delay where Class A and Class B aircraft constitute 1 percent to 10 percent of the total aircraft population. Class A aircraft is equivalent to large jets (B-707, B-747, DC-8, DC-10, and L-1011); Class B aircraft is equivalent to small jets (B-737, B-727, and DC-9) and large turbo-props. (Cheyenne Airport falls into this category for all planning periods with 5.9 percent in 1992.)

- VFR arrivals - One-minute average delay to all aircraft.

- Instrument Flight Regulations (IFR) arrivals or departures - Four minutes average delay to arrivals or departures, whichever occurs first.

The following lists factors that affect the capacity of the runway:

- The configuration of the runways, namely number, spacing and orientation;

- Taxiways;

- Occupancy time of runway;

- o Aircraft mix; and
- o Weather (visibility and wind) which determine whether VFR or IFR conditions exist.

The hourly capacity of the existing runways was determined to be between 99 and 152 operations per hour (Table 3.5.3-2). Airport traffic control personnel estimate from experience that 75 to 90 operations per hour is a more realistic figure.

The weighted hourly capacity is 115 operations per hour which converts to 160,000 operations per year. This value is 36 percent greater than the 1990 forecast operations.

Terminal Capacity. Criteria for terminal capacity are given by the FAA in Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs through 1980 as 24,200 square feet (sq ft) per 100 typical peak hour passenger (TPHP). For Cheyenne, the TPHP is estimated to be 0.12 percent of the annual flow or 62 in 1990 (Ashford and Wright 1979).

Thus, approximately 15,000 sq ft of terminal space will be required. Although this is still 1,000 less than presently available, the present arrangement only allows 570 sq ft for security area and no space for a secured waiting area. Airport management suggests that approximately 5,000 sq ft would be needed to add facilities necessary to efficiently serve the commercial passengers.

Parking Spaces at the Terminal. One of the greatest difficulties concerning airport access is the determination of the parking requirements. Parking demand is a function of the number of persons using the airport terminal and the duration of the parking period. The parking duration is related to the type of person making a trip (i.e., businessperson, traveler, armed forces service personnel, or visitor). Furthermore, the facilities should also consider short and long-term parking. Besides passengers, there are parking needs for car rentals, limousines, employees, and persons having business with the terminal tenants. No criteria are presently available that relate to airport enplaning or deplaning passengers to number of spaces required. The number of spaces available to the public for parking is too small at present. Traffic congestion is particularly critical in the airport post office area where a series of traffic islands serve to confuse rather than direct traffic flow. Increases in air traffic at Denver's Stapleton Airport will exacerbate parking problems at Cheyenne Airport as Cheyenne travelers will increasingly use local flights between Cheyenne and Denver due to parking deficiencies at Stapleton. Even under baseline conditions, action is required immediately to improve traffic flow at the terminal. As a start, removal of the United Airlines Fountain in Eighth Avenue would help the problem. Also, additional parking space could be provided for use by rental cars, thus freeing space at the terminal parking lot. As the airport continues its normal growth, parking problems will become critical in the near future. Failure to resolve this problem could stifle the growth of the airport.

There has been some preliminary discussion of taking a small park area across from the terminal for use by rental car agencies, freeing about 50 spaces for

Table 3.5.3-2

HOURLY CAPACITY OF EXISTING RUNWAYS - CHEYENNE

Runway(s)	Capacity (Number of Operations per Hour)
26	102
30	100
8	100
12	99
34	102
16	102
26 & 30	102
8 & 12	152
30 & 34	150
12 & 16	102
8 & 34	126
16 & 26	102

the public adjacent to the terminal. However, there are no definite plans or schedules for this.

Finding a suitable location for a parking facility represents the biggest problem rather than determining the number of parking spaces. A detailed analysis of the space requirements and alternative sites for the parking area is needed, even under the baseline condition.

3.5.3.1.2 Area Airports

Based on the forecast growth in real personal income, a 6 percent growth in operations at area airports was assumed. Traffic projections are summarized in Table 3.5.3-3.

Two C-130 aircraft may be based at Guernsey-Platte County Airport by the Wyoming National Guard in the near future. However, even with these additional aircraft, the added traffic should still fall within the average annual growth rate of 6 percent, which projects to about 26,000 annual operations in 1990.

Scotts Bluff County Airport has a annual capacity of 130,000 operations and an hourly capacity of 58 operations. These capacity volumes, based on the Scotts Bluff County Airport Master Plan Technical Report (July 1978) are well above the 1990 annual operations of 60,000 projected by the area growth factor and the 81,300 operations projected for 1990 by the Master Plan. The Master Plan states that the passenger terminal area required will be 11,000 sq ft compared to the existing 3,656 sq ft.

With the airport authority having commissioned the preparation of a master plan, Kimball Airport is currently targeted for expansion. Improvements foreseen include extending the existing 3,750 foot runway to a minimum of 6,000 feet, provision of a jet fuel storage facility, and construction of additional hanger space. Business and private aircraft often bypass Kimball at present due to the short runway.

With the increased competition of smaller air taxis and air carriers and the expansion of service to smaller communities, it is possible that Kimball could be added to the Scottsbluff-Cheyenne-Denver route by one of the air carriers.

3.5.3.1.3 Memorial Hospital Heliport - Cheyenne

It is difficult to determine if a heliport will be constructed. Problems described in Section 2.6.3.2.3 would have to be resolved before the heliport could be built.

3.5.3.2 Proposed Action

3.5.3.2.1 Cheyenne Airport

There are two factors that could result in impacts on the Cheyenne Airport. One is the increased corporate and freight traffic related to the project. The various manufacturers and high technology companies may occasionally bring personnel to the project site on a temporary basis. This would include

Table 3.5.3-3

PROJECTED BASELINE AVIATION OPERATIONS AT AREA AIRPORTS

	Pine Bluffs Municipal	Guernsey/Platte County	Phifer Field (Wheatland)	Torrington Municipal	Kimball Municipal	Mitchell Municipal	Scotts Bluff County
1982	2,800	16,200	18,000	15,800	7,500	778	37,150
1983	2,968	17,172	19,080	16,748	7,950	825	39,379
1984	3,146	18,202	20,225	17,753	8,427	874	41,742
1985	3,335	19,294	21,438	18,818	8,933	927	44,246
1986	3,535	20,452	22,725	19,947	9,469	982	46,901
1987	3,747	21,679	24,088	21,144	10,037	1,041	49,715
1988	3,972	22,980	25,533	22,413	10,639	1,104	52,698
1989	4,210	24,359	27,065	23,757	11,277	1,170	55,860
1990	4,463	25,820	28,689	25,183	11,954	1,240	59,211

Assembly and Checkout personnel, advisors, specialists, and government personnel (Air Force, Department of Defense, and congressional representatives).

The other factor is the use of helicopter and small aircraft by the contractor. Because of the driving distances from the dispatch stations to the various sites, helicopters and small aircraft could occasionally be used to shuttle personnel, supplies, and small equipment to the sites and back. The increase due to these types of operations is difficult to predict. The only basis on which to predict impact is the Minuteman III project 10 years ago. However, written records of the Minuteman III construction period are difficult to find because of less detailed record keeping at the time and the transfer of airport operations from the City of Cheyenne to City/County operations in the interim. Most information on that period was gathered from discussions with persons involved at the time. This included pilots, control tower personnel, and residents. These discussions indicate that the increase in total operations due to that project were in the range of 10 percent.

Based on the following assumptions, added operations at Cheyenne were estimated:

Based aircraft at Cheyenne:

4 total aircraft

Assume 4 aircraft x 6 operations/day
(3 roundtrips) = 24 operations/day

24 operations/day x 5 days/week x 52 weeks/year
= 6,240 operations/year

Assumed 8 corporate and freight operations/day
x 5 days/week x 52 weeks/year = 2,080 operations/year

Total added operations/year of 8,320 to be added to general aviation operations.

Assume 75 percent of corporate and freight operations are jets. Projected aviation operations during the project are summarized in Table 3.5.3-4.

3.5.3.2.1.1 Capacity Analysis

Runway Capacity. The highest project-related hourly peak occurs in 1990 with 100 operations. This approximately equals the lowest hourly peak of 99 shown in Table 3.5.3-2. However, the project-related operations would seem to be spread over the day rather than at peak hours and should not pose any problems to runway capacity. Total operations of 125,287 projected for 1990 fall below the annual operations capacity of 160,000.

The additional project-related traffic may slightly increase the deterioration of runway pavement.

Apron Capacity. If during construction activities contractors utilize helicopters to speed access to sites, then additional apron space will be required. There are two possible solutions to this problem:

Table 3.5.3-4

PROJECTED AVIATION OPERATIONS WITH PROJECT - CHEYENNE

Year	Total Enplaning Passengers	Commercial Jet Operations	Commercial Turbo Operations	Total Commercial Operations	Jet General Aviation	General Aviation	Military Operations	Total Jet Operations (3+6)	Total Operations (5+7+8)	Peak Monthly	Daily Peak	Hourly Peak
1983	32,700	1,170	4,730	5,900	13,182	52,730	16,194	14,352	74,824	8,293	498	60
1984	34,891	130	12,240	12,370	15,626	64,583	16,356	15,756	93,309	10,342	620	74
1985	38,297	136	12,852	12,988	16,568	68,353	16,520	16,704	97,861	10,846	651	78
1986	41,334	143	13,495	13,638	17,574	72,375	16,685	17,717	102,698	11,382	683	82
1987	44,138	150	14,170	14,320	18,647	76,666	16,852	18,797	107,838	11,952	717	86
1988	46,117	158	14,878	15,036	19,792	81,246	17,020	19,950	113,302	12,558	753	90
1989	49,080	166	15,622	15,788	21,013	86,132	17,190	21,179	119,110	13,201	792	95
1990	51,952	174	16,403	16,577	20,756	83,025	17,362	20,930	116,964	12,963	778	93

1) Park helicopters on grass areas to be allocated by airport officials.

2) Lease grass areas to contractors for the duration of the project which contractors could pave, should they require a paved apron.

Terminal Capacity. Peak project-related enplanements will occur in 1986 and may require slight increases in terminal space and parking facilities over baseline needs. This will have a low impact and be not significant because it will not appreciably change demand.

Parking Spaces at the Terminal. Existing parking space at the Cheyenne Airport is strained and normal growth will pose a critical problem. Project-related demand will not increase appreciably in relation to the baseline situation and will only exacerbate an already critical situation. This will have a low impact and be not significant because it will not appreciably change demand.

The Proposed Action will not result in any changes to FAA regulations concerning overflying in the area.

Overall, the Cheyenne Airport will have a low and not significant short term impact. Project-related demand during the operational phase will have a negligible impact.

3.5.3.2.2 Area Airports

The only area airport that may receive any impact is Kimball Municipal Airport. During construction of the Minuteman missile silos 20 years ago, Kimball, Nebraska, was used as a construction staging area. A fleet of helicopters were operated out of Kimball by an Omaha-based service under contract to the construction contractor. It is believed that approximately six helicopters were based at Kimball.

Kimball is a possible site as a dispatch station under the project, and the assumption of again having six helicopters based there is reasonable. The Kimball Airport is in a rural area away from residential property and has a large capacity to handle a number of helicopters, both for air operations and ground parking areas, though hangar space is limited.

The improvements proposed under the Kimball Airport expansion scheme will increase the prospect of this airport being utilized more heavily during the construction phase of the project. However, airport capacity will not be exceeded and the impact will be low and not significant.

Other than the impact of construction-related operations at Kimball, area airports will see very minor impact. Since all of the airports are on the periphery of the construction area, none of these serve as good distribution or operational areas. Some minor increase in general aviation traffic may occur due to the contractors' use of small planes, but all of the airports are extremely under capacity.

Scotts Bluff County Airport may see some slight increase in commercial passenger traffic due to the distribution of the added population and activity throughout the area. However, existing commercial service is more than adequate in handling any increase in passenger traffic. All other area airports will receive negligible impact due to their locations on the edge of the project.

One possible affect on aviation does not concern airports. During construction of the Minuteman missile, contractors often used nearby farms as landing areas for small airplanes. This was done by arranging previously for the owner's permission, usually with a small monetary reimbursement. This could reoccur during project construction. However, the use of helicopters is much more accepted and actively used today.

In general, the impact on area airports should be negligible, except at Kimball, where the impact will be low and not significant. In fact, most impacts may be of a beneficial nature, adding landing fees, use of ground services, and air passenger traffic to a number of airports.

3.5.3.2.3 Memorial Hospital Heliport - Cheyenne

Should the Cheyenne Memorial Hospital heliport be constructed, then an obvious benefit will be the ability to provide emergency medical treatment to persons injured at project construction sites. Since distance increases the reaction time to a medical emergency at construction sites, the use of helicopters to airlift the injured to area receiving hospitals is a logical means to maximize early treatment.

Although not quantifiable, the increase in construction activity, due to project modifications and construction, the indirect increases in construction activity at the local level, and the overall increase in population may create a greater demand on emergency medical care and may increase the demand for a heliport at Memorial Hospital.

3.5.4 Public Transit

3.5.4.1 Baseline Future - No Action Alternative

Jitney, Inc., a privately owned company, has been operating in Cheyenne for only a short time, and offers a minimum LOS to the community. Few people use this service which only carries 300 to 400 passengers per week. If adequate ridership develops, additional service in the form of additional routes and decreased headways might be justified. As shown in Figure 2.6.4-1, Jitney, Inc. has given consideration to future routing in the city.

This includes a northern route to operate north on Central Avenue and Yellowstone Road, an eastern route to operate on 16th Street and Lincolnway, and a route to serve Laramie County Community College.

The implementation of this additional service depends upon ridership increases which are difficult to forecast at this time. Ridership is presently low, and the buses operate at about 20 percent or less of capacity.

Transit demand in an auto-oriented community like Cheyenne is not readily measured. If ridership does not exist in an area under consideration, demand can be determined by implementing service. Ridership levels then determine the extent of service that can be justified. Demand for inter-city bus service is likewise difficult to anticipate.

Taxi service is currently also operating at a low level in Cheyenne. Preliminary indications are that at present, both the current taxi service and bus service carry riders with similar characteristics and limited mobility options.

Both Greyhound and Trailways are projecting 5 to 10-percent growth in passenger traffic across their whole systems.

Based on the present limited service provided, it would appear that only slight increases in ridership would occur in the foreseeable future.

3.5.4.2 Proposed Action

Project-related demand would result in Cheyenne from increases in population and housing due to the project. As described in previous sections of this report, it is anticipated that project-related growth would be almost evenly distributed throughout the community with the northeastern area of the city receiving a greater proportion of inmigrants. The magnitude of this increase has also been specified in previous chapters.

It is doubtful if the current or anticipated transit service is adequate to attract project-employee work trips. Routings are very limited, and the long headways offer a poor transportation alternative for work purposes. However, family members of accompanied workers may be candidates for transit service. This would be especially true for the employees anticipated to be housed in the area near College Drive south of the central city where there is a lack of shopping facilities and other commercial services. The area is also fairly close to both the Central Business District and other significant attractions, such as Laramie County Community College. The apparent potential for transit demand in this area is somewhat muted by consideration of the relatively high income levels of the project-related employees. Low income groups generally have greater transit usage than higher income groups.

If local bus service is implemented in the anticipated project-related housing areas, past experience would indicate that ridership may follow. If adequate ridership develops, additional service in the form of additional routes and decreased headways might be justified. This would necessitate the acquisition of additional buses and operators. While Jitney, Inc., does have two spare buses, it is uncertain whether one of these could be permanently committed for line service. The lead time for bus acquisition can be several months, so anticipated needs must be carefully monitored. The spare buses of the Jitney fleet could possibly be adequate to implement trial service, but additional buses would probably be needed if permanent routes were developed. New operators must also be trained; this could be done in a relatively short time.

Taxi service is a premium transportation option due to the relative high cost of service. The effect of the project on taxi service is difficult to assess. It appears that the project-related employee would have occasion to

use taxi service for convenience reasons, and may increase taxi demands. The taxi situation is less critical than transit. If additional demand occurs, the taxi operator could readily add vehicles and drivers.

The demand for rental cars and other rental vehicles is expected to increase as a result of the project. This industry operates in a frequently changing market and is capable of handling fluctuating user demand. No shortage of rental vehicles is projected for the duration of the project, and additional vehicles required could be readily added..

In general, the project impact on the transit and taxi system in Cheyenne will be negligible and not significant.

High income levels of project-related employees would indicate a low demand for intercity bus service. The increased level of economic activity would probably result in limited demand increases.

3.5.5 Pedestrian and Bicycle Facilities

3.5.5.1 Baseline Future - No Action Alternative

Improvements to the Cheyenne network of bikeway systems will happen as part of some major thrust such as the overall development of Crow Creek as a recreation corridor, or redevelopment of Fox Farm Road or Nationway. The City is anticipating, through various land use policies, to encourage developers to install bikeways, pedestrian paths, and greenbelts as part of their individual undertakings. The Nationway improvement is probably a low priority and may not happen until 1992. It can be stated with some degree of confidence that there will be substantial improvements in a secondary system which will serve as a feeder into the master system.

The secondary system is that system which will be part of various developments which are programmed to be built by 1992. Examples of this can be seen in the Village Creek South project located in South Cheyenne, and Meadowbrook Park located in north Cheyenne on Dell Range Boulevard. Both of these projects have been designed with an intense interior bike and pedestrian network which can be easily linked with the master system.

City of Cheyenne and State funding for bikeway and pedestrian facilities is currently running at approximately $50,000 per year, of which $15,000 is provided by the WHD.

3.5.5.2 Proposed Action

The relative population increases and distribution related to the project will cause a low impact that is not significant on the Cheyenne pedestrian and bikeway network. The very nature and layout of the existing network will meet much of the demand of the increased population. However, certain areas will be impacted more heavily than others, such as around schools and colleges catering to the increased population during the construction phase of the project.

With the anticipated population distribution, project effects will occur to some degree in the northeast quadrant of the city in the vicinities of Dell

Range, Converse, Windmill, and Ridge Road. Effects will be discernible in the area of North College above Dell Range Boulevard. Of concern are those areas adjacent to schools since these tend to be heavy bike and pedestrian travel routes and involve younger people.

Overall the project will have a low and not significant impact on pedestrian and bicycle facilities.

A relatively small number of households will constitute the permanent workforce after 1990 and will have a negligible impact on the pedestrian and bicycle system.

3.6 Summary of Impacts

3.6.1 Impact Matrix

The effects of the Proposed Action on the transportation resource which have been described previously, are summarized in Figure 3.6.1-1.

Overall, the transportation facilities will be substantially improved due to the upgrading of the existing T/E road network. Short-term, adverse impacts will occur due to the construction activities associated with F.E. Warren AFB and the LFs. For example, traffic congestion may occur at various locations in Cheyenne, most noticeably at the Interstate 25 at Randall Avenue interchange. Also, construction activities associate with the LFs and the T/E road system may have an adverse impact on rural roadways. The long-term, beneficial effects of the Proposed Action appear to far outweigh the short-term, adverse impacts.

It should be noted regarding Alternatives R1, R2, and R3, that none of the alternatives change the overall effect of the road impact evaluation at the local level.

Cable alternatives will have negligible impacts that are not significant.

The Proposed Action for the dispatch stations, which includes Kimball and Chugwater, has a low impact that is not significant.

Railroad capacity in the ROI would be negligibly impacted and the impact is not significant.

The capacity of land-side facilities at Cheyenne Airport would have a low impact that is not significant since possible increased operations, over an extended period of time, would not warrant any appreciable physical improvements. Impacts on area airports are low and not significant, primarily due to the Kimball impact.

Negligible impacts would occur on public transit systems and low impacts on pedestrian and bicycle facilities in Cheyenne. The impacts are not significant.

LEGEND		ADVERSE IMPACTS	SIGNIFICANT ADVERSE IMPACTS
LEVEL OF IMPACT*	LOW	∘	•
	MODERATE	○	●
	HIGH	◯	⬤
POTENTIAL BENEFICIAL EFFECTS			░
* MEASURE OF THE AMOUNT OF ENVIRONMENTAL CHANGE			

	PROJECT IMPACTS					
	SHORT TERM			LONG TERM		
	SITE	LOCAL	REGIONAL	SITE	LOCAL	REGIONAL
TRANSPORTATION	•	●	•	░	░	░
Roads	•	●	•	░	░	░
Level of Service	∘	●	∘			
Physical Condition		∘		░	░	░
Queues		●				
Delay	●	∘	●			
Safety	∘	∘	∘	░	░	░
Railroads		∘				
Aviation		∘				
Cheyenne		∘				
Area Airports		∘				
Public Transit						
Pedestrian and Bicycle Facilities		∘				

TRANSPORTATION SUMMARY IMPACT MATRIX

FIGURE NO. 3 6.1-1

3.6.2 Aggregation of Elements, Impacts, and Significance

Figure 3.6.1-1 presented the aggregation of impacts for transportation as a whole. The aggregated rating for transportation results in low and significant impacts at the site level in the short term, moderate and significant impacts at the local level for the short term, and low and significant impacts at the regional level for the short term. Long-term effects to roads are considered beneficial.

The overall rating for transportation was based on a qualitative professional evaluation of subelements and then elements as given in Figure 3.6.1-1. The level of impact for the subelements of roads at the site level were basically low except for delay which was rated moderate and significant. Thus, the aggregated level of impacts at the site level for roads is low and significant. At the local level the moderate and significant level of impact roads reflects the fact that several subelement impacts are moderate and significant. The low and significant level of impact to the regional level reflects the moderate and significant level of impact for delay. The overall rating for transportation, again based on qualitative professional evaluation, reflects the dominance of roads among the five elements.

The short-term, site impacts, are due to construction activities on and near the roads in the DA. The short-term, local impacts, are due to the added volume of traffic which will cause a decrease in LOS at a number of intersections and an increase in queuing at the Randall Avenue gate to F.E. Warren AFB. The short-term regional impacts are due to the roadway construction activity on the regional transportation system as a whole. The overall long-term impacts to transportation are beneficial due to the improvement of the physical condition of DA roads and the associated increase in safety.

As shown in Table 3.6.1-2, the cable alternatives to the Proposed Action have a negligible and not significant impact. The project element alternative for the dispatch stations has a low and not significant impact. Alternative R3 of the F.E. Warren AFB circulation routes has a low and not significant impact due to the amount of construction activities and their effect on Round Top Road and Interstate 80. Proposed Action R2 has a low and not significant impact due to construction delays encountered when the Happy Jack Road bridge is removed. Alternative R1 has a high level of impact on delays that will be significant due to the Country Club Road bridge improvements.

The impacts of cable, roads, and dispatch alternatives are summarized in Figure 3.6.1-2.

3.7 Mitigation Measures

Potential mitigation measures that will be considered are identified below with the objective of increasing the LOS and reducing delays and queuing. One, some, or all of the mitigation measures may ultimately be selected. Each measure identifies the party responsible to implement, but not necessarily to fund, the measure.

LEGEND		Adverse Impacts	Significant Adverse Impacts
LEVEL OF IMPACT*	Low	○	●
	Moderate	○	●
	High	○	●

* Measure of the Amount of Environmental Change

	CABLE PATHS[1]											ROADS[2]			DISPATCH[3] STATIONS		
	Proposed Action					Alternative						Proposed	Alternative		Proposed	Alternative	
	PA1	SB1	RB1	PA4	PA5	PD1	SB2	PB1	PA2	PA3	RB2	R2	R1	R3	Two	One	None
TRANSPORTATION												○	●	○	○	○	

FIGURE 3.6.1-2 TRANSPORTATION ALTERNATIVE COMPMRISON MATRIX

Mitigation measures for roads are listed for consideration;

- Schedule work hours for project-related employees to avoid normal current traffic peak hours. This mitigation will be effective in controlling peak-hour traffic flow increases, and if selected, should be implemented throughout the construction and Assemblyand Checkout phases of the project. The responsible parties for implementing this mitigation measure are the Air Force and their contractors.

- Coordinate with local jurisdictions to minimize construction-related problems. This may involve the formation of coordinating committees that serve as a forum to address transportation issues. This mitigation will be effective in reducing potential conflicts, and if selected, should be implemented throughout the construction phase of the project. The responsible parties for implementing this mitigation are the Air Force Site Activation Task Force, construction management, contractors and state and local officials.

- Provide project-related employees incentives for using high occupancy vehicles such as van pools or car pools. This mitigation will be effective in reducing the project-related traffic increase, and if selected, should be implemented throughout the construction phase of the project. The responsible agencies for implementing this mitigation measure are the Air Force and their contractors.

- Modify the geometric design of the Interstate 25 interchange at Randall Avenue. This mitigation will be effective in increasing the capacity and safety of this interchange, and if selected, should be implemented by the end of 1984. The responsible agency for implementing this mitigation measure is the WHD.

- Improve traffic signalization and make related geometric improvements at the intersections of Yellowstone Road with Prairie Avenue and Central Avenue; at various intersections on 19th Street and 20th Street between Pershing Boulevard and Missile Drive; at various intersections on Pershing Boulevard between Converse Avenue and Randall Avenue; at the intersection of 16th Street with Ames Avenue and Missile Drive; at the intersections of 24th Street with Central Avenue and Carey Avenue; and at the intersection of Snyder Avenue with Randall Avenue. These mitigation measures will be effective in raising the level of service, and if selected, should be implemented by the end of 1984. The responsible agencies for implementing these mitigation measures are the City of Cheyenne and the Wyoming Highway Department.

- Improve traffic signalization and make related geometric improvements in Wheatland at the Ninth Street at South Street intersection, the 16th Street at South Street intersection, and the Ninth Street at Gilchrist Street intersection. These mitigation measures will be effective in raising the LOS at these intersections, and if selected, should be implemented by the end of 1985. The responsible agency for implementing these mitigation measures is the Town of Wheatland and the WHD.

- Improve traffic signalization and related road improvements in Torrington to the intersection of Main Street and U.S. 26 and 85. This mitigation measure will be effective in raising the LOS, and if selected, would be implemented by the end of 1986. The responsible agencies for implementing this mitigation are the Town of Torrington and WHD.

- Use of irretrievable resources, particularly aggregated for road construction, can be minimized through use of appropriate design methods. The FHWA has suggested that consideration be given to stabilizing existing gravel in place as a means to reduce aggregate usage on T/E road improvements. If selected, this mitigation should be implemented in the preliminary design phase of the project. The responsible agencies for implementing this mitigation measure are the WHD and the NDOR.

No mitigation measures are required for railroads, aviation, public transit, and pedestrian and bicycle facilities.

3.8 Unavoidable Adverse Impacts

It does not appear that there would be any residual adverse impacts resulting from the project. Short-term adverse impacts due to road construction are unavoidable.

3.9 Irreversible and Irretrievable Resource Commitments

There are no irreversible and irretrievable resource commitments for Transportation.

4.0

GLOSSARY

4.0 GLOSSARY

4.1 Terms

Accompanying Dependents: spouses, children and other such dependents who inmigrate with workers.

All-or-Nothing Assignment: the process of allocating the total number of trips between each pair of analysis areas to the path or route with the minimum travel time.

Analysis Area, Analysis Unit: the basic geographical entity or portion of a study area delineated for transportation analysis. In the context of the user's guide, the smallest area/unit is the zone, whereas the largest could be a subregion.

Annual Average Daily Traffic: denotes daily traffic averaged over 1 calendar year.

Annual Average Weekday Traffic: denotes that the specified period includes only weekdays, Monday through Friday.

At-Grade Road: roadway surface is at the same elevation as surrounding land, rather than on a bridge or depressed right-of-way.

Auto Person-Trips: trips made as a driver or a passenger in an automobile. Thus, auto person-trips constitute the sum of auto driver and auto passenger trips.

Average Daily Traffic (ADT): the average number of vehicles passing a specified point during a 24-hour period.

Baseline: the characterization of an area under no-project conditions.

Base Year: the year selected to which the major portion of the data are related. It is usually taken as the year of the survey.

Capacity: in transportation studies, the maximum number of vehicles having a reasonable expectation of passing over a given section of a lane or a road in one direction (or in both directions for a two-lane or a three-lane highway) during a given time period under prevailing roadway and traffic conditions.

Capacity Restraint: the process by which the assigned volume on a link is compared with the practical capacity of that link and the speed of the link adjusted to reflect the relationship between speed, volume, and capacity. The procedure is iterative until a realistic balance is achieved.

Centroid: an assumed point in a zone that represents the origin or destination of all trips to or from the zone. Generally, it is the center of trip ends rather than a geometrical center.

Count: a volume counted on the street, which may be used for comparison with the present traffic volume assigned to the corresponding link. The count may be directional or total two-way, peak hour - morning and/or afternoon - and/or a 24-hour value.

Destination: the location at which a trip terminates.

Direct Effects: effects resulting solely from project implementation.

Direct Worker: construction, Assembly and Checkout, Site Activation Task Force, or operations employees who are required for building and operation of the missile, including site preparation.

Distribution: the process by which movement of trips between zones is estimated. Distribution may be measured or estimated by a growth factor process or by a synthetic model.

Dwelling Unit: a room or group of rooms occupied or intended for occupancy as separate living quarters, by a family or other group of persons living together or by a person living alone.

Effect: a change in an attribute. Effects can be caused by a variety of events, including those that result from project attributes acting on the resource attribute (direct effect); those that do not result directly from the action or from the attributes of other resources acting on the attribute being studied; those that result from attributes of other projects or other attributes that change due to other projects (cumulative effects); and those that result from natural causes (e.g., seasonal change).

Expressway: a divided arterial highway for through traffic with full or partial control of access and generally with grade separations at intersections.

Freeway: a divided arterial highway designed for the safe nonimpeded movement of large volumes of traffic, with full control of access and grade separations at intersections.

Fringe Area: that unincorporated area adjacent to a community containing residential and nonresidential uses similar in character to the incorporated portions of a community.

Gravity Model: a mathematical model of trip distribution based on the premise that trips produced in any given area will distribute in accordance with the accessibility of other areas and the opportunities they offer.

Growth Factor: a ratio of future trip ends divided by present trip ends.

Heavy Trucks: all vehicles having three or more axles and designated for the transportation of cargo. Generally, the gross vehicle weight is greater than 26,000 pounds.

Home-Based Nonwork Trip: a trip for the purpose of shopping, or for a social-recreational purpose, or for any other purpose other than work, with one end at the residence of the trip-maker.

Home-Based Work Trip: a trip, for the purpose of work, with one end at the residence of the trip-maker.

Impact: an assessment of the meaning of changes in all attributes being studied for a given resource, an aggregation of all the effects, usually measured using a qualitative and nominally subjective technique.

Indirect Effects: effects resulting from the attributes of other resources acting on the attribute being studied. For example, direct project employees will spend some of their income locally. As a result, local industries will tend to hire more workers as they expand in response to the increased demand. This additional employment is termed an "indirect effect".

Indirect Employment: employment resulting due to the secondary and tertiary effects of direct project expenditures.

Infrastructure: the system of public utility lines, communication facility networks and roadways which connect all the structures and facilities in a given locale.

Inmigrants: all people relocating into a defined geographic area, usually calculated on an annual basis.

Level of Service: in transportation studies, a qualitative measure of the flow of traffic along a given road in consideration of a wide variety of factors, including speed and travel time, traffic interruptions, and freedom to maneuver. Levels of service are designated A through F, A being a free-flow condition with low volumes and high speeds, and F being a congested condition of low speeds and stop-and-go traffic. Intermediate levels describe conditions between these extremes.

Light-Duty Vehicles: automobiles and light trucks with two axles and four wheels, designed primarily for transportation of nine or fewer passengers (automobiles) or for transportation of cargo (light trucks). Generally, the weight is less than 10,000 pounds.

Local Street: a street intended only to provide access to abutting properties. In traffic assignment, any link having a centroid as one node.

Long Term: denotes the steady-state operations phase of the project when a constant level of project employment is attained.

Medium Trucks: all vehicles having two axles and six wheels designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 10,000 pounds but less than 26,000 pounds.

Minimum Path: that route of travel between two points which has the least accumulation of time, distance, or other parameters to traverse.

Mitigations: methods to reduce or eliminate adverse project impacts.

Mobile Home: a single-family dwelling unit which is transportable in one or more sections, built on a permanent chassis, and designed to be used with or without a permanent foundation. Does not include travel trailers or recreational vehicles.

Modal Split: the division of person-trips between public and private transportation. The process of separating person-trips by mode of travel.

Model: a mathematical formula that expresses the actions and interactions of the elements of a system in such a manner that the system may be evaluated under any given set of conditions; i.e., land use, economic, socioeconomic, and travel characteristics.

Mode of Travel: means of travel such as auto driver, vehicle passenger, mass transit passenger, or walking.

Multifamily Dwelling: a housing unit designed to provide shelter for more than one family, such as an apartment building.

Network: a system of links describing a transportation system for analysis.

Nonhome-Based Trip: a trip that takes place between two points, neither of which is the home end of the trip-maker.

Orientation: the directional distribution of trips relative to the compass, i.e., the northern sector, or the eastern sector, and so forth.

Origin: the location of the beginning of a trip or the zone in which a trip begins.

Peak Hour: the 60 minutes observed during either the morning or evening peak period that contains the largest mount of travel.

Peak-Hour Factor: the fraction of the average daily traffic volume occurring during the highest volume 60-minute period during the day.

Peak Period: the two consecutive morning or evening 60-minute periods which collectively contain the maximum amount of morning or evening travel. Peak period can be associated with person-trip movement, vehicle trip movement, or transit trips.

Peak Year: the year in which some particular project-related effect e.g., total employment, is greatest.

Primary Impact: (see Impact) impacts due to direct influences from project activities.

Recreational Vehicle: a self-propelled vehicle designed to provide mobile, temporary living accommodations for human beings.

Rural: that area outside of towns, cities or communities; characterized by very low density housing concentrations, agricultural land uses, and general lack of most public services.

Secondary Impact: (see Impact) impacts due to indirect influence from project activities, i.e., transporting materials to project site.

Short Term: 1) that period which is usually defined in economic terms by a fixed supply of some essential production input (usually capital equipment), and/or 2) a period of time between the start of construction and the achievement of a steady-state operations phase. During this period, employment needs fluctuate substantially, rising to a peak level in the earlier phase and declining in the latter.

Significance: the importance to the resource of the impact on the resource. Council of Environmental Quality (CEQ) regulations specify several tests to determine whether an action will significantly affect the quality of the human environment. While these tests apply to the entire action, they can also be used in an amended form to judge impact significance for individual resources. It is important to note that a high impact may not be significant, while a low impact may. Significance is an either/or determination: the level of impact described either is significant or is not significant. Additionally, beneficial significance must be determined at the same level as adverse significance. As specified in the CEQ regulations, significance needs to be determined for each of the three geographic areas: local, regional, and national. This places the impact into context. Significance is also determined in terms of intensity.

Site Specific: conditions characteristic of a geographically defined location that may vary considerably from characteristics of adjacent locations or the characteristics of a larger area within which the location in question is contained.

Traffic Assignment: the process of determining route or routes of travel allocating the zone-to-zone trips to these routes.

Transit Headway: the time between consecutive transit vehicles operating the same line at a given point on a transit route. In the case of a route that has more than one transit line with similar destinations the transit headway can be calculated as the time between transit vehicles, at a point along the route, for those lines collectively.

Transportation Facilities: all structures used for transportation of people or goods, including roads, railroads, and airports.

Trip: a one-direction movement which begins at the origin and ends at the destination.

Trip Attractions: the number of home-based trip ends at the nonresidence end of the trip-maker.

Trip Distribution: the process by which the movement of trips between zones is estimated. The data for each distribution may be measured or estimated by a growth factor process or by a synthetic model.

Trip End: a trip origin or a trip destination. Trip ends for a location are the summation of origins and destinations.

Trip Generation: a general term describing the analysis and application of the relationships that exist between the trip-makers, the urban area, and the trip making. It relates to the number of trip ends in any part of the urban area.

Trip Length: the length of a trip measured in miles; may be airline distance or over-the-road distance.

Trip Productions: the number of home-based trip ends at the residence ends of the trip-maker.

Trip Purpose: the reason for making a trip.

Trip Table: a table showing trips between zones - either directionally or total two-way. The trips may be separated by mode, by purpose, by time period, by vehicle type or other classification.

Urban: that area within towns, cities or communities, characterized by densities greater than one dwelling unit per acre.

Worst Case: the combination of all the worst possible effects to result potentially from the actions of a project.

Zone: geographically, the smallest analysis area for transportation analysis. A zone might vary from less than 1 square mile to about 10 square mile depending on the study area.

4.2 Acronyms

ACS	Area of Concentrated Study
ADT	Average Daily Traffic
AF	Air Force
AFB	Air Force Base
ALSF	Approach Lighting Systems with Sequenced Flashers
ARTCC	Air Route Traffic Control Center
ATR	Automatic Traffic Recorder
BN	Burlington Northern Railroad
C&NW	Chicago and North western Transportation Company
C&S	Colorado and Southern Railroad
CAPCD	Colorado Air Pollution Control Division
CBD	Central Business District
CBR	California Bearing Code
CFR	Code of Federal Regulations
CIV	Clegg Impact Device
CMA	Critical Movement Analysis
DA	Deployment Area
DAR	Defense Access Road
DHV	Design Hour Volume
DOT	Department of Transportation
EPA	Environmental Protection Agency
EPTR	Environmental Planning Technical Report
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Rail Administration
G/C	Green to Cycle
HBNW	Home-Based Nonwork Trips
HBW	Home-Based Work Trips
ICAP	Intersection Capacity Analysis Program
IFR	Instrument Flight Regulations
ILS	Instrument Landing System
LF	Launch Control Facility
LIRL	Low Intensity Runway Lighting System
LOS	Level of Service
MTMC	Military Traffic Management Command
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NDOR	Nebraska Department of Roads
NHB	Nonhome Based Trips
O/D	Origin/Destination
PHV	Peak Hour Volume
ROI	Region of Influence
RV	Recreational Vehicles
SIA	Structure Inventory and Appraisal
SSA	Stage Storage Area
S/T	Stage Transporter
T/E	Transporter/Erector
TPHP	Typical Peak-Hour Passenger
UP	Union Pacific Railroad
VASI	Visual Approach Slope Indicators
VFR	Visual Flight Regulations
WHD	Wyoming Highway Department

WSA	Weapons Storage Area
WSEO	Wyoming State Engineer's Office

4.3 Units of Measurement

ft	foot/feet
in	inch
mi	mile
mph	miles per hour
sq ft	square foot/feet

5.0

REFERENCES CITED AND REVIEWED

5.0 REFERENCES CITED AND REVIEWED

Ashford, Norman and Paul H.Wright
1979 Airport Engineering. New York.

Babcock, D. Ronald, and William E. Morgan
1975 Highway Travel in Wyoming, An Analysis of Highway Travel in Wyoming: An Origin-Destination Study. College of Commerce and Industry, University of Wyoming, Laramie.

Babcock, D. Ronald
1976 Projection of Highway Travel in Wyoming 1970-1975: an Orgin-Destination Study. Division of Business and Economic Research, College of Commerce and Industry, University of Wyoming, Laramie.

Banner Associates, Inc., and R. Dixon Speas Associates
1979 Airport Master Plan for General Brees Field (Final Report). Prepared for City of Laramie and Albany County.

BRW/Noblitt, Inc.
1978 Master Plan for Scotts Bluff County Airport. Report prepared for Scotts Bluff County Supervisors.

BRW/Noblitt, Inc.
1979 Cheyenne Municipal Airport Master Plan. Report prepared for Cheyenne Airport Board.

BRW/Noblitt, Inc.
1979 Cheyenne Municipal Airport Master Plan Technical Report. Prepared for Cheyenne Airport Board.

Cheyenne Airport Board
1981 Cheyenne Airport Annual Report.

Cheyenne Airport Board
1982 Cheyenne Airport Annual Report.

Cheyenne, City of, Engineering Department
1979-1981 Annual Summaries of Traffic Accident Records. Compiled by the Department.

Cheyenne Laramie County Regional Planning Office
1983 A Park and Recreation Facilities Master Plan for Greater Cheyenne (Draft).

CSSA & Wirth Associates
1977 Cheyenne Bikeway System Master Plan & Construction Documents. Report prepared for the City of Cheyenne Planning Department.

Federal Aviation Administration
1980 Ten Year Plan.

Federal Aviation Administration
Aviation Demand and Airport Facility Requirement Forecasts for Medium Air Transportation Hubs through 1980.

Federal Aviation Administration
1983 Air Traffic Data for Cheyenne Airport 1979-1983.

Federal Highway Administration
1978 Manual on Uniform Traffic Control Devices.

Institute of Transportation and Traffic Engineering, University of California, Intersection Capacity Analysis (ICAP), Los Angeles, CA.

International City Management Association
1973 Planning and Development of Bikeway Systems. Washington DC.

National Academy of Sciences, National Research Council
1965 Highway Capacity Manual. Highway Research Board Special Report 87, Wasnington, DC.

National Cooperative Highway Research Program
1978 Report 187. Quick - Response Urban Travel Estimation Techniques and Transferable Parameters.

National Highway Institute
1981 Highway Safety Engineering Study. Federal Highway Administration, Washington, DC.

Nathan, C., and Pouppirt, R.
1975 Two-Wheeling in Cheyenne. Cheyenne-Laramie County Regional Planning Office.

Nebraska Department of Aeronautics
1977 State Airport System Plan for State of Nebraska 1977-1997. Report prepared and adopted July 15, 1977, revised November 17, 1978, Lincoln.

Nebraska Department of Aeronautics
1983a Nebraska Aeronautical Chart. Lincoln.

Nebraska Department of Aeronautics
1983b Nebraska Airport Directory. Lincoln.

Nebraska Department of Roads
1979 Rules and Regulations of the State of Nebraska Department of Roads Pertaining to Permits for the Movement of Overweight and Overdimensional Vehicles or Loads Effect, August 11, 1979, revised April 30, 1981.

Nebraska Department of Roads
1981 1980 Average Daily Traffic/2000 Average Daily Traffic (Forecast). Lincoln.

Nebraska Department of Roads
1981 Traffic Flow Map. Lincoln.

Nebraska Department of Roads
1983a Challenge of the 80s: Nebraska Highway Programs In Fiscal Years 1983-1988. Lincoln.

Nebraska Department of Roads
1983b Nebraska Rail Plan (draft version). Lincoln.

Nebraska Department of Roads
1983c Railroads (map). Lincoln.

Nebraska Public Service Commission
1974 Map of Nebraska. Lincoln.

Nebraska State Highway Commission
1983 Challenges of the 80s, Nebraska Highway Program for Fiscal Year 1983-1988. Lincoln.

Noblitt & Associates
1976 Wyoming State Airport System Plan. Report prepared for Wyoming Aeronautics Commission, Cheyenne.

Pignataro, Louis
1971 Traffic Engineering Theory and Practices. Prentice Hall, Englewood Cliffs, NJ.

Texas Transportation Institute, Texas A & M University
Passer II-80 Computer Program, Austin, TX.

Texas Transportation Institute, Texas A & M University
1976 Traffic Engineering. College Station, TX.

Transportation Research Board
1978a Freight Movement and Demand. Transportation Research Record 668, Washington, DC.

Transportation Research Board
1978b Quick-Response Urban Travel Estimation Techniques and Transferable Parameters. TRB187, Washington, DC.

Transportation Research Board
1980 Highway Capacity Manual Interim Guidelines.

U.S. Air Force AFRCE-BMS
1982 Defense Access Roads Technical Report of Work in Progress for Near Term M-X Basing. M-X Environmental Planning Process Report for the Facility Program Manager, Air Force Regional Civil Engineer - M-X, Norton AFB, CA, March 19.

U.S. Air Force AFRCE-BMS
1983 Defense Access Road Needs Report for Peacekeeper in Minuteman Silos. Peacekeeper Environmental Planning Process Report for the Facility Program Manager, Air Force Regional Civil Engineer BMS, Norton AFB, CA, July 25.

U.S. Department of Transportation
Highway Safety Engineering Studies Procedural Guide.

Wyoming State Highway Department, Planning Branch
1979 Wyoming Rail Network Milepost Book. Cheyenne.

Wyoming State Highway Department
1981 Design - Hour Traffic Volumes at Automatic Traffic Recorders in Cheyenne Area.

Wyoming State Highway Department
1983 Telephone interview with staff of Planning Division.

6.0

LIST OF PREPARERS

6.0 LIST OF PREPARERS

Brian Allison, Transportation Assistant, URS Company
B.S., 1982, Business, Minerals/Land Management, University of Colorado, Boulder
Years of Experience: 1

Bruce Arey, P.E., Structural Engineer, Louis Berger & Associates
B.S., 1975, Structural Engineering, Worcester Polytechnic Institute, Worcester, Massachusetts
Years of Experience: 8

Sandi Ashbaugh, Graphic Illustrator, URS Company
B.A., 1977, Anthropology, Fort Lewis College, Durango, Colorado
B.A., 1977, Scientific and Medical Illustration, Fort Lewis College, Durango, Colorado
Years of Experience: 10

Eduardo R. Auzmendi, Junior Transportation Engineer, URS-Berger
B.S., 1983, Civil Engineering, Old Dominion University, Norfolk, Virginia
Years of Experience: 1

Geoffrey L. Baillie, Principal Planner, URS Company
B.S., 1969, Nuclear Engineering, University of Wisconsin, Madison
Years of Experience: 13

Robert Ball, Engineer, PRC Voorhees, Inc.
M.S.C.E., 1980, Virginia Polytechnic Institute, Blacksburg
B.S.C.E., 1977, Virginia Polytechnic Institute, Blacksburg
Years of Experience: 4

Dave Bredahl, Transportation Engineer, URS Company
B.S., 1976, Economics, Colorado State University, Fort Collins
Years of Experience: 3

Arturo S. Catapang, P.E., Senior Civil Engineer, Louis Berger & Associates
B.S., 1950, Civil Engineering, Rizal Memorial College, Republic of the Philippines
Years of Experience: 26

Morel Cohn, Senior Transportation Engineer, Louis Berger & Associates
M.S., 1953, Institute of Railroad Engineering, Bucharest, Rumania
Years of Experience: 30

Pasquale E. Corsetti, P.E., Transportation Resource Manager, Louis Berger & Associates
B.S., 1975, Civil Engineering, Villanova University, Pennsylvania
M.S., 1976, Transportation Engineering, Purdue University, Lafayette, Indiana
Years of Experience: 8

Jo Ann Coxey, Transportation Planner, URS Company
B.A., 1978, Physical Geography, University of Colorado, Boulder
Years of Experience: 5

Meris Delli-Bovi, Senior Technical Writer, URS Company
B.A., 1973, English, Williams College, Williamstown, Massachusetts
Graduate Fellow, 1973, English, Columbia University, New York, New York
Years of Experience: 8

Carlos De Maria, Senior Civil Engineer, Louis Berger International, Inc.
B.S., 1968, Civil Engineering, University of Buenos Aires, Argentina
Years of Experience: 15

Thomas F. Donahue, Assistant Transportation Resource Manager, URS-Berger
B.S., 1978, Civil Engineering, Northeastern University, Boston, Massachusetts
Years of Experience: 5

Cathleen D. Douglas, Systems Analyst, URS Company
B.S. Candidate, 1983 to 1984, Metro State College, Denver, Colorado
Years of Experience: 3

Mikel Ellison, Transportation Assistant, Louis Berger & Associates
B.S., 1980, Civil Engineering, South West Texas University
Years of Experience: 2

Austin H. Emery, P.E., Senior Transportation Engineer, Louis Berger & Associates
B.S., 1947, Civil Engineering, Rensselaer Polytechnic Institute, Troy, New York
M.S., 1949, Soil Mechanics, Harvard University, Cambridge, Massachusetts
Years of Experience: 34

Augustin Famisan, Senior Civil Engineer, Louis Berger & Associates
B.S., 1952, Civil Engineering, National University, Manila
Years of Experience: 31

Larry Lee Felzien, P.E., Bridge Project Engineer, URS Company
B.S., 1970, Structural Engineering, University of Colorado, Boulder
Years of Experience: 13

Harold E. Fitzgerald, P.E., Principal Civil Engineer, Louis Berger & Associates
1956, Lowell Institute of Technology, Massachusetts
1957, Albany State College, New York
1979, Northeastern University, Boston, Massachusetts
Years of Experience: 31

Frederick S. Hickman, Human Resources Director, URS-Berger
B.A., 1966, Economics, Drew University, Madison, New Jersey
M.A., 1974, Economics, Rutgers University, New Brunswick, New Jersey
Years of Experience: 17

Dennis Iwata, Environmental Engineer, Transportation Module Manager, AFRCE-BMS/DEV
B.S., 1972, Landscape Architecture, California Polytechnic University, Pomona
Years of Experience: 11

A.P. Johnson, Transportation Assistant, Louis Berger & Associates
Buena Vista College, Stone Lake, Iowa
Years of Experience: 33

Michael Karas, P.E., Traffic Signal/Electrical Engineer, Louis Berger & Associates
B.S., 1971, Electrical Engineering/Control Systems, University of Massachusetts, Amherst
M.B.A., 1973, Finance, University of Massachusetts, Amherst
Years of Experience: 10

Sheri Kauffman, Technical Writer, URS Company
B.A., 1982, Technical Journalism, Colorado State University, Fort Collins
Years of Experience: 2

Richard J. Kramer, E.P., NAEP, Natural Resources Director, URS-Berger
B.A., 1960, Biology, St. John's University, Collegeville, Minnesota
M.S., 1962, Plant Ecology, Arizona State University, Tempe
Ph.D., 1968, Plant Ecology and the Physical Environment, Rutgers University, New Brunswick, New Jersey
Years of Experience: 23

Sandra Lautenberg, Staff Economist, Louis Berger & Associates
B.S., 1980, History, Rutgers University, New Brunswick, New Jersey
M.C.R.P., 1982, Economic Planning, Rutgers University, New Brunswick, New Jersey
Years of Experience: 3

Howard McCann, P.E., Transportation Resource Manager, URS Company
B.S., 1960, Civil Engineering, University of Texas, Austin
M.S., 1963, Transportation Engineering, Texas A & M University, College Station
Ph.D., 1981, Urban & Regional Science, Texas A & M University, College Station
Years of Experience: 23

Laura Mosczynski, Researcher, URS Company
B.A., 1982, Environmental Science, University of Denver, Colorado
Years of Experience: 1

Eugene G. Muhich, P.E., Senior Transportation Engineer, URS Company
B.C.E., 1955, Civil Engineering, University of Minnesota, Minneapolis
Years of Experience: 28

David Mulligan, Assistant Transportation Resource Manager, Louis Berger International, Inc.
B.S., 1977, Civil Engineering, Leicester University, England
M.S., 1983, Civil Engineering, Imperial College, London University, England
Years of Experience: 6

Ian D. Powrie, Civil Engineer, Louis Berger & Associates (Deceased*)
B.A., 1981, Civil Engineering, Cambridge University, England
M.S., 1982, Geotechnical Engineering, University of California, Berkeley
Years of Experience: 2
* Mr. Powrie was killed aboard Korean Air Lines Flight 007 on September 1, 1983.

Henriette Rosenberg, Civil Engineering Technician, Louis Berger & Associates
B.S., 1957, Technical School of Architecture, Rumania
Years of Experience: 26

Syed A. Salam, P.E., Principal Traffic Engineer, Louis Berger & Associates
B.S., 1963, Civil Engineering, East Pakistan University of Engineering and Technology, Dacca, East Pakistan
M.S., 1970, Civil Engineering, New Jersey Institute of Technology, Newark
Years of Experience: 20

Wendie C. Sandvik, Planner, URS Company
B.A., 1973, Biology/Speech Pathology Audiology, University of Denver, Colorado
Years of Experience: 11

Randy Schulze, Environmental Scientist, Louis Berger & Associates
B.S., 1976, Biology, University of South Florida
M.S., 1980, Environmental Science, University of Florida
Years of Experience: 5

Derek M. Sherman, P.E., Senior Transportation Engineer, Louis Berger & Associates
B.A., 1965, Economics, Lehigh University, Bethlehem, Pennsylvania
B.S., 1966, Civil Engineering, Lehigh University, Bethlehem, Pennsylvania
M.B.A., 1967, Business Administration, Lehigh University, Bethlehem, Pennsylvania
Years of Experience: 16

Peter Smith, Senior Traffic Engineer, Louis Berger International, Inc.
B.S., 1975, Civil Engineering, Southampton University, England
Years of Experience: 8

Raymond Volpe, P.E., Senior Traffic Engineer, Louis Berger & Associates
B.S., 1952, Structures/Civil Engineering, Polytechnic Institute of Brooklyn, New York
M.S., 1961, Transportation Engineering, Polytechnic Institute of Brooklyn, New York
Years of Experience: 28

APPENDIX A

APPENDIX A

TRAVEL DEMAND FORECASTING MODEL

This appendix illustrates procedures utilized in the development of the travel demand forecasting model.

Traffic impacts were assessed through the use of manual study techniques and computerized travel demand forecasting models. Travel demand forecasting models essentially predict the impact that policies or programs will have on urban activities and subsequently on travel demand. The models provide detailed information such as anticipated traffic volumes on roadway networks. Knowing the future demand, an assessment can be made of the performance of alternative transportation systems.

The results of this process allow a determination of roadway links where capacity deficiencies may occur. Rational decisions can then be made concerning the transportation facility improvements that may be warranted.

Travel demand models typically involve several steps, including data collection, trip generation, trip distribution, and trip assignment. Trip generation determines the number of trips that will be made, while trip distribution determines where the trips will go. Trip assignment predicts the routes that the trips will take.

Travel demand models are normally developed and calibrated for existing conditions, and then applied to future year conditions.

The procedures outlined in the National Cooperative Highway Research Program (NCHRP) Report 187, Quick-Response Urban Travel Estimation Techniques and Transferable Parameters, were followed for the travel demand modeling process. The trip distribution and traffic assignment steps were performed with MicroTRIPS, a set of transportation planning software programs developed by PRC Voorhees, Inc. for use on a microcomputer.

A.1 Existing Conditions

A.1.1 Information Needs

A significant amount of information must be collected before the travel demand forecasting process can begin. This includes a definition of the study area, and the urban activities, transportation system, and travel characteristics associated with the area.

A.1.1.1 Study Area

The study area included the developed area of Cheyenne plus the area to be affected by additional population within the applicable timeframe of the project. The transportation analysis units, referred to as traffic zones, were based on the U.S. Bureau of the Census system of tracts and block groupings. The Census groupings were used since Census data, aggregated at this level, provided a basic input to the travel demand process.

A.1.1.2 Urban Activities

Travel demand forecasting models should be based on the simplest information possible for which reasonable forecasts can be made. The models can then be applied to information forecasts in order to determine future travel demands. The travel demand models require information concerning the number of households, the income range of the households, and the retail and non retail employment for each traffic zone. Household information was obtained from the 1980 Census; employment information was obtained from Dun's Marketing Services.

A.1.1.3 Transportation System

The transportation system consists of the basic elements of the roadway network. The network is described in terms of roadway links including distance measurements, number of lanes, and travel speeds. Each intersection is numbered as a traffic node and each traffic zone is numbered as a centroid. Current traffic information was also obtained for the road network. Network information was obtained from the Wyoming Highway Department, the City of Cheyenne, and Laramie County.

A.1.1.4 Travel Information

The travel demand forecasting process requires information on the daily household person-trips. The trip generation characteristics were developed utilizing procedures from NCHRP Report 187. External traffic characteristics (trips originating outside the Cheyenne area) were obtained from the Wyoming Highway Department.

A.1.2 Trip Generation

Trip generation is the process that quantifies the relationship between urban activity and travel. The urban activity forecasts provide information on the location and intensity of urban activities. Trip generation procedures translate these activity forecasts into travel demand. Trip generation consists of three basic components -- production models, attraction models, and external trip models.

Trip productions are based on the relationship between trip making and household characteristics of income and auto ownership.

Cross-classification techniques were used for trip production analysis. This is a technique in which the change in one variable, such as trips, can be measured when the change in other variables, such as the number of households, is made.

Trip attraction analysis is directed toward the activities -- such as stores, offices, or facilities -- that attract trip productions. The number of measured trip attractions is related to a measure of activity such as the number of employees at a factory.

Trip production and attraction rates provided in NCHRP 187 were used to calculate the number of productions and attractions per traffic zone. The three trip purposes used in the analysis were home-based work (HBW), home-

based non work (HBNW) and non home-based (NHB). Table A.1.1-1 shows the applicable trip production table from NCHRP 187. The recommended equations for trip attractions are shown below.

TO ESTIMATE TRIP ATTRACTIONS FOR AN ANALYSIS AREA USE:

$$\text{HBW Trip Attractions} = F_1\ [1.7\ (\text{Analysis Area Total Employment})]$$

$$\text{HBNW Trip Attractions} = F_2\ 10.0 \begin{pmatrix}\text{Analysis} \\ \text{Area Retail} \\ \text{Employment}\end{pmatrix} + 0.5 \begin{pmatrix}\text{Analysis Area} \\ \text{Non-Retail} \\ \text{Employment}\end{pmatrix} + 1.0 \begin{pmatrix}\text{Analysis Area} \\ \text{Dwelling} \\ \text{Units}\end{pmatrix}$$

$$\text{NHB Trip Attractions} = F_3\ 2.0 \begin{pmatrix}\text{Analysis} \\ \text{Area Retail} \\ \text{Employment}\end{pmatrix} + 2.5 \begin{pmatrix}\text{Analysis Area} \\ \text{Non-Retail} \\ \text{Employment}\end{pmatrix} + 0.5 \begin{pmatrix}\text{Analysis Area} \\ \text{Dwelling} \\ \text{Units}\end{pmatrix}$$

Where: F_1, F_2, F_3 are areawide control factors

TO DEVELOP AREAWIDE CONTROL FACTORS, USE:

$$F1 = \frac{\text{Areawide Production for HBW Trips}}{1.7\ (\text{Areawide Total Employment})}$$

$$F_2 = \frac{\text{Areawide Production for HBNW Trips}}{10.0 \begin{pmatrix}\text{Areawide} \\ \text{Retail} \\ \text{Employment}\end{pmatrix} + 0.5 \begin{pmatrix}\text{Areawide} \\ \text{Non-Retail} \\ \text{Employment}\end{pmatrix} + 1.0 \begin{pmatrix}\text{Areawide} \\ \text{Dwelling} \\ \text{Units}\end{pmatrix}}$$

$$F_3 = \frac{\text{Areawide Productions for NHB Trips}}{2.0 \begin{pmatrix}\text{Areawide} \\ \text{Retail} \\ \text{Employment}\end{pmatrix} + 2.5 \begin{pmatrix}\text{Areawide} \\ \text{Non-Retail} \\ \text{Employment}\end{pmatrix} + 0.5 \begin{pmatrix}\text{Areawide} \\ \text{Dwelling} \\ \text{Units}\end{pmatrix}}$$

Household data from the 1980 Census were used as input to Table A.1.1-1 to develop trip productions. The Census included information on the number of households, the median household income, and the number of households with zero, one, two, and three or more vehicles available. To illustrate the procedure, assume that the 1980 Census showed that Zone 81 had a median income of $11,591; 405 total households; 81 households with no autos; 251 households with 1 auto; 69 households with 2 autos, and 4 households with 3 or more autos.

Since the Census median income figure was shown in 1979 dollars, the U.S. Department of Labor consumer price index must first be used to convert the 1979 dollars to 1970 dollars. Once this conversion is done, Table A.1.1-1 which is in 1970 dollars, can be used directly. Using this procedure, the $11,591 median income figure corresponds to the 1970 income group of $6,000-$7,000. The analytical procedure for determining trip production is shown in the matrix below:

Table A.1.1-1

DETAILED TRIP-GENERATION CHARACTERISTICS

URBANIZED AREA POPULATION: 50,000-100,000

Income Range 1970 $ (000's)	Avg. Autos Per HH	Average Daily Person Trips Per HH	% HH by Autos Owned				Average Daily Person Trips Per HH by No. of Autos/HH				% Average Daily Person Trips by Purpose		
			0	1	2	3+	0	1	2	3+	HBW	HBNW	NHB
0-3	0.56	4.5	53	39	7	1	2.0	6.5	11.5	12.5	21	57	22
3-4	0.81	6.8	32	58	10	1	2.2	8.0	13.0	15.0	21	57	22
4-5	0.88	8.4	26	61	12	1	2.6	9.5	14.5	16.5	21	57	22
5-6	0.99	10.2	20	62	17	1	3.0	11.0	15.5	18.0	18	59	23
6-7	1.07	11.9	15	64	20	1	3.0	12.5	16.5	19.5	18	59	23
7-8	1.17	13.2	11	64	23	2	3.5	13.3	17.0	21.5	16	61	23
8-9	1.25	14.4	8	62	28	2	4.8	14.0	17.5	22.5	16	61	23
9-10	1.31	15.1	6	60	32	2	5.5	14.3	17.5	24.0	16	61	23
10-12.5	1.47	16.4	3	49	44	3	6.2	15.0	18.5	25.5	15	62	23
12.5-15	1.69	17.7	2	38	52	8	6.1	15.0	19.0	25.5	14	62	24
15-20	1.85	18.0	2	28	57	13	6.0	13.5	19.5	23.0	13	62	25
20-25	2.03	19.0	1	21	58	20	6.0	13.0	20.0	23.0	13	62	25
25+	2.07	19.2	1	19	59	21	6.0	12.5	20.0	23.0	13	62	25
Weighted Average	1.55	14.1	12	47	35	6	4.6	12.6	17.2	21.4	16	61	23

Note: HH - Households.

Auto Ownership per Households	No. of Households	Trips/ Household	Total Trips
Zero Autos	81	3.0	243
One Auto	251	12.5	2,761
Two Autos	69	16.5	1,070
Three Or More Auto	4	19.5	72
Total Households =	405	Total Trips =	4,196

The total trips can then be converted into trip purposes by using the rates from Table A.1.1-1. This procedure is illustrated below:

	HBW		HBNW		HNB	
Total Trips	%	No.	%	No.	%	No.
4,146	18	746	59	2,446	23	954

The trip attraction procedures require an estimation of total employment, retail employment and non retail employment by traffic zone. This information was obtained from Dun's Marketing Services.

The employment data included the employers name, address, number of employees, and a classification code for the type of employment. The data were then aggregated by traffic zone and the total number of retail and non retail employees determined. These data were then used with the preceeding equations to determine trip attractions.

A.1.3 Trip Distribution

Trip distribution analysis is the process by which trips originating in one zone are distributed to the other zones in the study area. The most widely used technique for accomplishing trip distribution is the gravity model. This approach is based upon Newton's gravitational law.

The gravity model formula is as follows:

$$T_{ij} = \frac{P_i A_j F(t)_{ij}}{\sum_{j=1}^{n} A_j F(t)_{ij}}$$

were:

T_{ij} = the number of trips produced in zone i and attracted to zone j
P_i = the trips produced in zone i
A_j = the trips attrcted to zone j
$F(t)_{ij}$ = the friction factor for interchange ij (based on travel time between i and j)
i = origin zone
j = Destination zone
n = number of zones in the study area

The gravity model states that the trips produced in zone i --

$$P_i$$

will be distributed to each other zone j --

$$T_{ij}$$

according to the relative attractiveness of each zone j --

$$\frac{A_j}{Aj}$$

and the relative accessibility of each zone j --

$$\frac{F(t)_{ij}}{F(t)ij}$$

The gravity model was used to distribute productions and attractions from each particular zone to other zones in the study area. Guidelines included in NCHRP 187 were followed in order to generate travel times and corresponding friction factors between zones. The average speed values inherent in determining the travel time (Table 5, NCHRP 187) were assigned to the appropriate roadway facilities and a traffic assignment was performed resulting in a table of costs (travel times) between all zones. These costs were then assigned friction factors as shown in Figures 7 through 12 of NCHRP 187 for the three trip purposes.

The production and attraction trip tables and friction factors were then input into the gravity model in order to distribute the trips for each trip purpose. The result is a production and attraction table for each trip purpose.

The production and attraction tables were factored to account for average auto occupancy and mode split, which results in a production and attraction table for each trip purpose. The tables were then transformed into origin/destination tables and summed to produce a trip table. The trip table shows the resulting travel flow between each pair of zones.

A.1.4 Traffic Assignment

Traffic assignment is the process of allocating a given set of trip interchanges to a transportation network. The assignment process is based on computer programs which select a minimum impedance route between pairs of zones. The computer programs then "assign" the trips between these zones to the selected route. The end result is the expected traffic load on the network.

The traffic assignment procedure known as "minimum path with capacity restraint" was used. In this procedure a minimum path algorithm is used in conjunction with a capacity restraint process. The minimum path algorithm essentially selects the minimum impedance route between two points. The speed (or travel time) on the links of the system determines the basic impedance.

The minimum path procedure can cause some links to be assigned more travel than the link has capacity This volume/capacity problem led to the development of capacity restraint procedures.

These restraint techniques are based on the fact that the speed of traffic decreases as the volume of traffic increases. The capacity restraint procedure attempts to balance the assigned volume, the capacity of the particular roadway link, and the speed on the link. Thus, if a roadway section is heavily utilized in a particular iteration, the average speed for the section will be reduced in the next iteration, which may result in motorists choosing an alternative path of travel. In this analysis, five iterations were performed for each traffic assignment. The end product of the traffic assignment process is the development of traffic volumes on the road network. Model calibration was done manually to adjust the model results to base year conditions.

A.2 Future Trends

Population forecasts for baseline time periods were prepared which in turn determined the future housing needs. The housing unit needs were allocated to various parts of the community where growth could logically occur. Using procedures described in Section A.1, trip productions were estimated for the total anticipated households.

The Wyoming Highway Department, City of Cheyenne, and Laramie County provided information routine to the status of the roadway network in the baseline time periods. Particular attention was paid to proposed roadway construction projects that would increase capacity.

Trip distribution and trip assignment procedures, described in Section A.1, were utilized to develop estimates of traffic volumes on the roadway network.

A.3 Project Impacts

Transportation impact assessment is an analysis of project-related traffic demand upon baseline transportation conditions in the study area.

The transportation system would be impacted by project-related employees and their activities. Project manpower and employee information were developed. Several classifications of employees (construction, assembly, military, and civilian operators) would be involved, and their numbers would vary with the area and others would be permanent residents. Some inmigrant employees would be accompanied by families, while others would come alone. The specific transportation impact of potential employee groups is discussed below:

- o Direct Employees - This category of employees would be directly involved in project construction and operation. Some of these employees would be inmigrants, while others would be permanent residents presently located in the area. These direct employees would travel daily to the project site, and would have impact on the project entrances and roads leading to the project entrances. In addition, the inmigrants and their families would generate additional travel (both work and non-work trips) that could impact other elements of the transportation system.

- Indirect Employees - This category of employees would not be directly involved in project construction and operation. Some of these employees would be inmigrants while others would be permanent residents living in the area. The inmigrants and their families would generate additional travel that could impact elements of the transportation system.

The 1985 average daily traffic (ADT) figures were developed as a function of the 1985 Cheyenne households, with the project, to the 1985 baseline Cheyenne households. As developed for the Socioeconomics EPTR, the project will result in 989 inmigrant households. This is 3.8 percent higher from the 23,800 baseline households. Thus the ADT figures were increased by 3.8 percent.

As developed in the Socioeconomics EPTR, the peak manpower requirements for Cheyenne will occur in 1985. About 1,400 people will be employed at F.E. Warren AFB. All of these employees will live off base in the Cheyenne area.

For a worst-case analysis, it was assumed that these employees would travel to the base during the same peak hour, with a vehicle occupancy of about 1.38. Studies made of current peak hour travel at the base show a vehicle occupancy of similar magnitude. Using a vehicle occupancy of 1.38 persons per vehicle yields, 1,017 peak hour vehicle trips to the base.

The 1,017 peak hour vehicle trips were allocated by the following procedures to various origin zones within Cheyenne:

- As developed for the Socioeconomics EPTR, it is assumed that 70 percent of the workers will come from Cheyenne. This 70 percent of the 1,017 trips was allocated to traffic zones in accordance with the general population distribution reported in the 1980 Census.

- The remaining 30 percent of the trips was allocated to traffic zones as shown below. This allocation is based on methodology developed for the Socioeconomic EPTR.

Traffic Zone	Percentage of Trips
45	22.9%
17	1.2%
47	18.8%
18	1.8%
13	4.6%
22	18.2%
44	5.9%
43	9.0%
41	3.1%
15	7.1%
48	4.7%
42	2.7%
TOTAL:	100.0

It was assumed that the three F.E. Warren gates on Interstate 25 would be equally used during the peak hour. This assumption reflects the fact that base work efforts will occur at the Stage Storage Areas with a Central Avenue gate entrance; at the Weapons Storage Areas with a Missile Drive gate entrance; and near the Randall Avenue gate entrance. Thus the 1,017 trips were allocated equally to these three gates.

With the peak-hour trip origins and destinations developed, the peak-hour base trips were then assigned to the roadway network. A total peak hour assignment resulted when the base-oriented trips were added to the other peak hour trips.

Capacity analysis for various signalized intersections was accomplished by using the Intersection Capacity Analysis computer program, ICAP.

The ICAP is a set of programs which perform intersection capacity analysis in accordance with the definitions and procedures of the Highway Capacity Manual (HRB Special Report No. 87). ICAP was developed by the Institute of Transportation and Traffic Engineering of the University of California in cooperation with the Automotive Safety Foundation. The program which calculates approach capacity is divided into four major parts depending upon the parameter to be determined - service volume, approach width, load factor, or G/C ratio. By inputting the known approach width and G/C ratio, and projected approach volumes for the four conditions, the program will calculate the load factor value.

Initially, the peak-hour factor, metropolitan area size, location in metropolitan area, rights turns, left turns, and bus factors were determined. Load factors are then determined.

Level of service designations were manually added using Table 10.13 of the Highway Capacity Manual as a guideline. Load factors were adjusted to approximate conditions under interconnnected signal operation where necessary.

Projected traffic for baseline 1985 was generated and assigned to the roadway network of Cheyenne, Wyoming (Figures A.3-1 and A.3-2). Traffic was also generated and assigned for additional traffic related to the Peacekeeper (Figures A.3-3 and A.3-4). This was added to the baseline traffic for 1985. The combination of volumes (Figures A.3-5 and A.3-6) were then used to determine a level of service. Table A.3-1 shows the intersections with a decrease in level of service.

For purposes of clarity, these figures show data for only those links impacted by the peak-hour project-related volumes. The data were also shown in the detail used for analysis purposes. Based on these levels of service changes, various street corridors were then evaluated. Reverse flow conditions were assumed for the PM traffic peak. Thus conditions on 19th Street eastbound during the PM peak were assumed to be the same as 20th Street eastbound during the PM peak.

Traffic conditions at various intersections should be evaluated with consideration given to the entire street corridor. For example, Table A.3-1 lists several intersection problems on Pershing, from Converse to Snyder. This would indicate that problems may occur on this entire corridor, rather than being limited to the specific intersections.

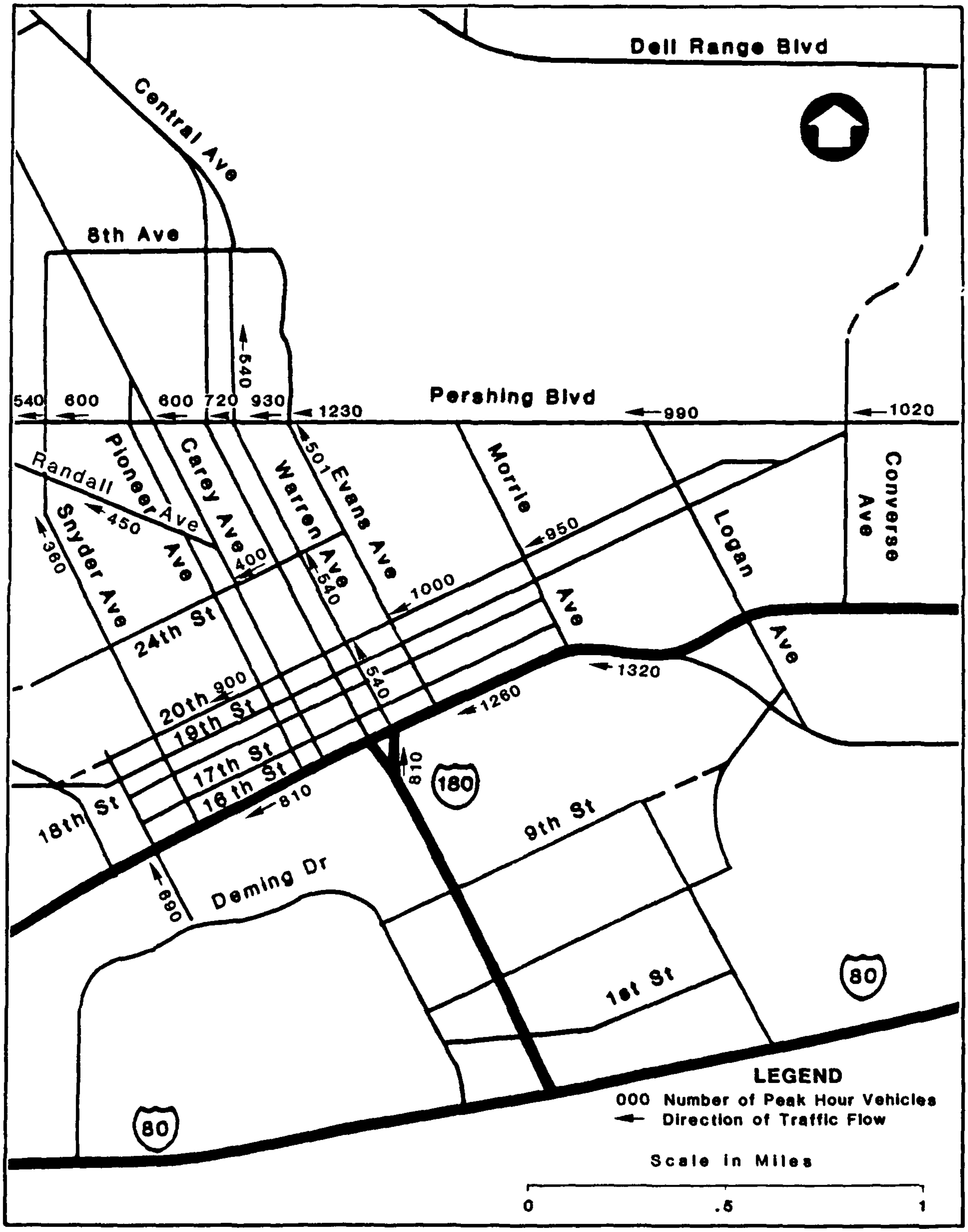


FIGURE A.3-1 1985 BASELINE A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

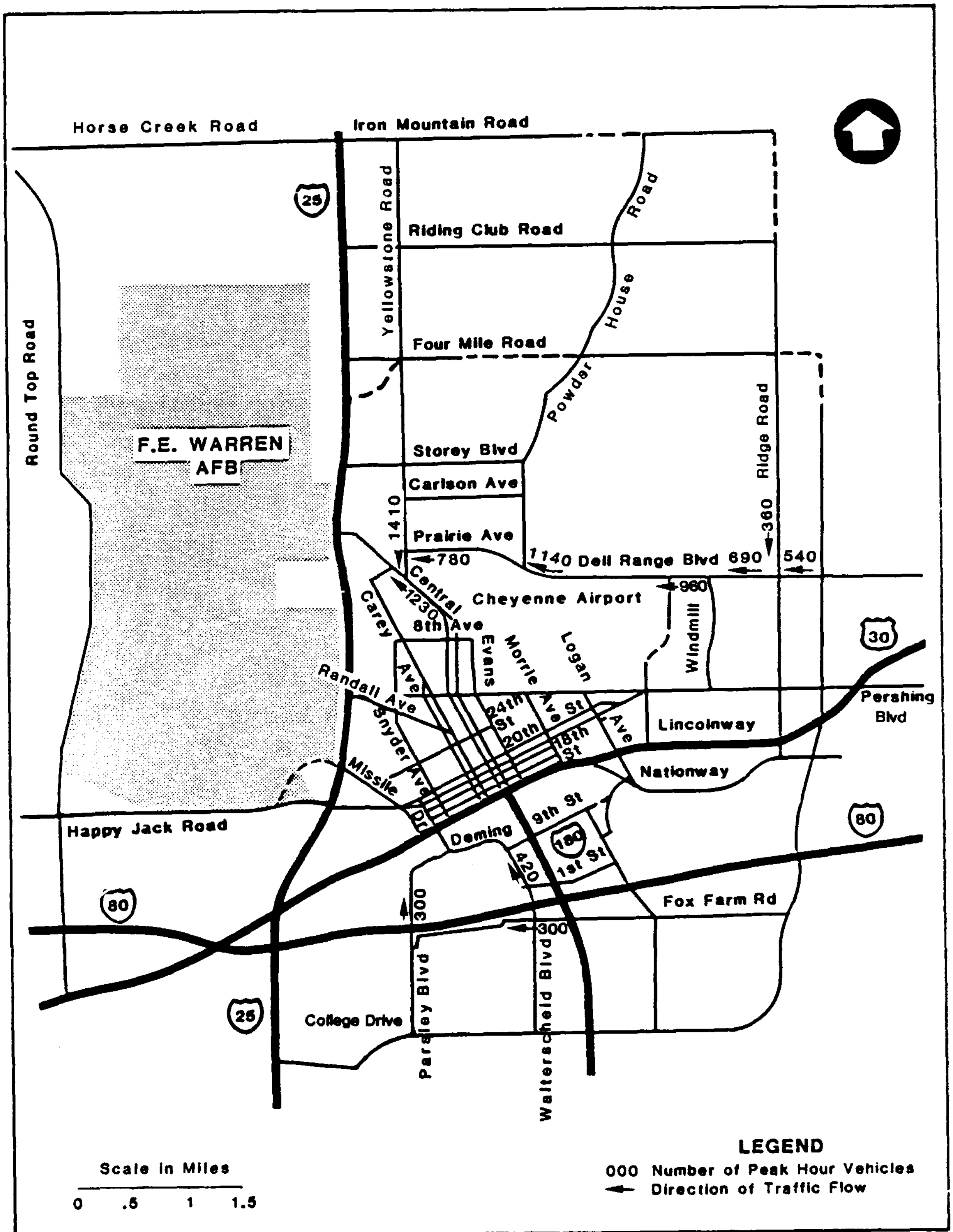


FIGURE A.3-2 1985 BASELINE A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

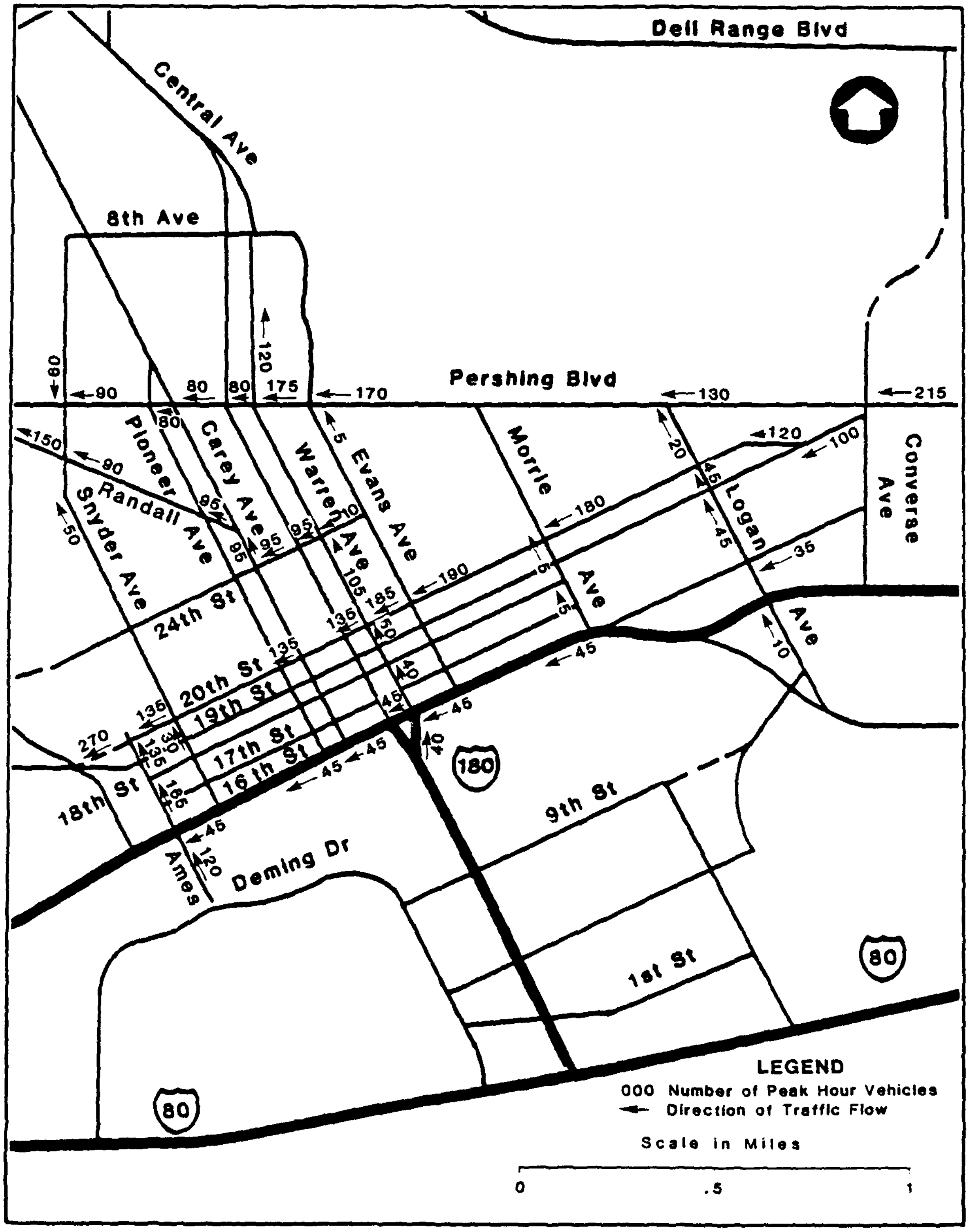


FIGURE A.3-3 1985 PEACEKEEPER A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

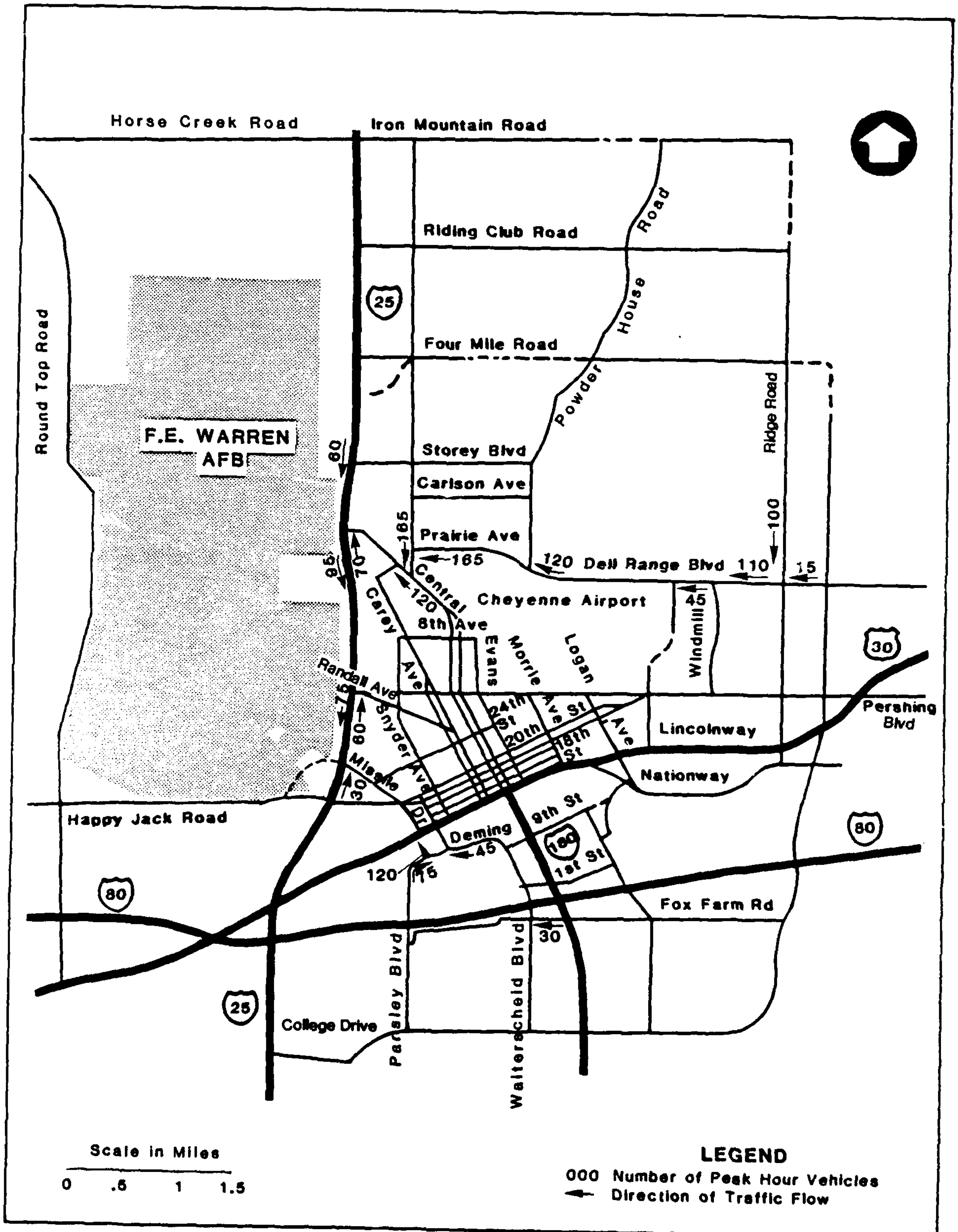


FIGURE A.3-4 1985 PEACEKEEPER A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

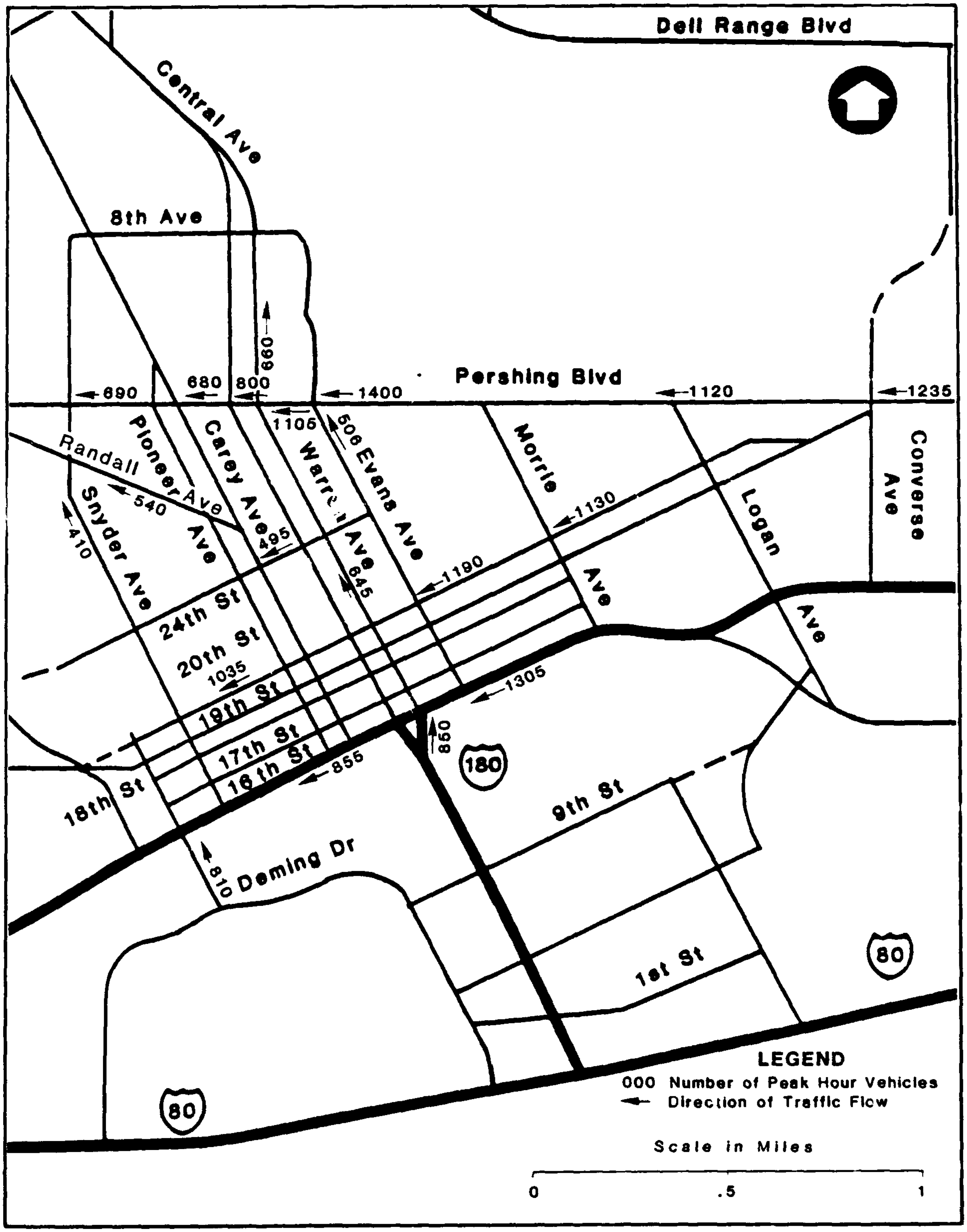


FIGURE A.3-5 1985 TOTAL PROJECTED A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

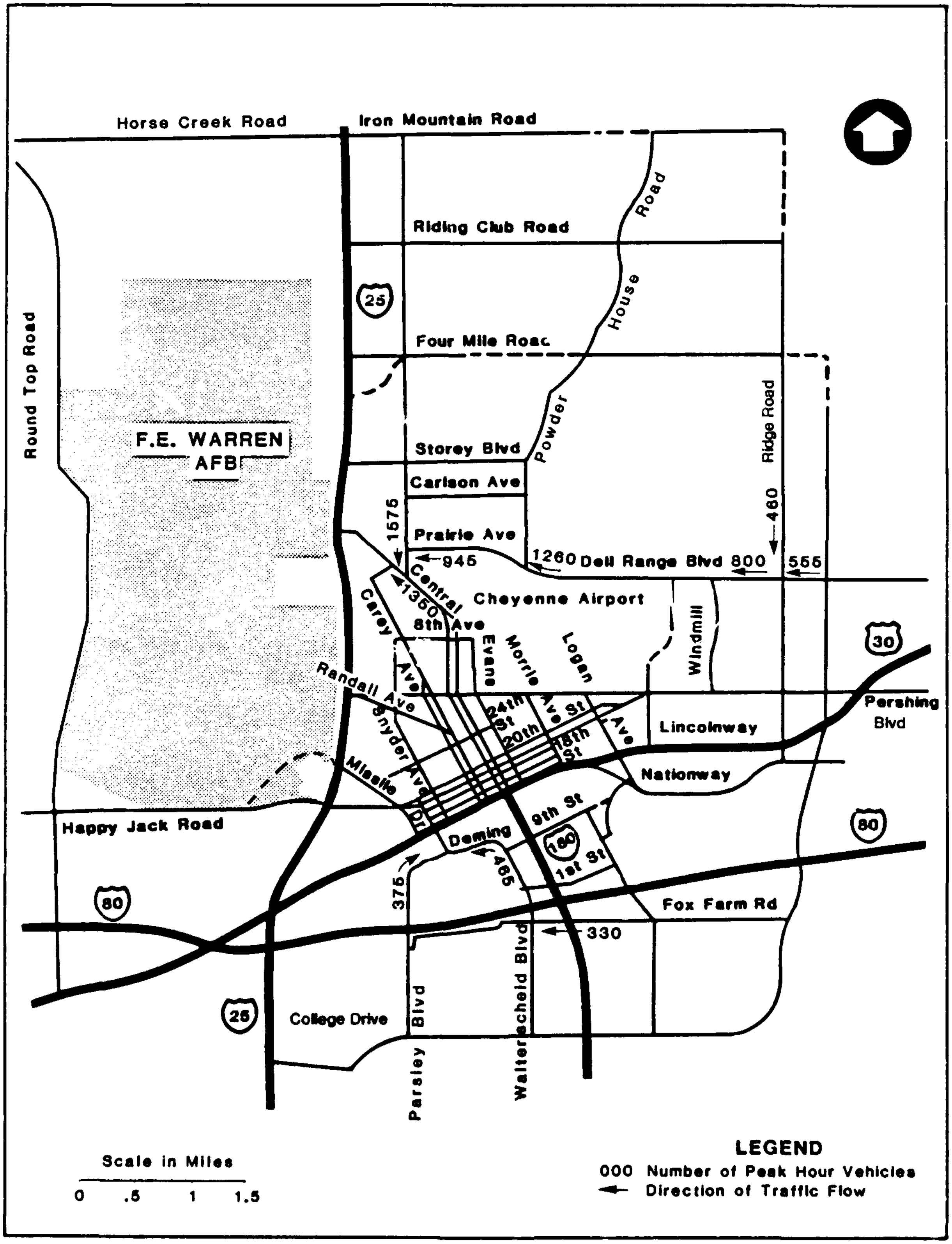


FIGURE A.3-6 1985 TOTAL A.M. PEAK HOUR TRAFFIC VOLUMES ON SELECTED ROADWAY SEGMENTS

Table A.3-1

INTERSECTIONS THAT DECREASE IN LEVEL OF SERVICE

Location		Level of Service Reductions	Level of Impact	Significance
Pershing	@ Snyder			
	Pershing WB	E-F	Moderate	Significant
	Snyder SB	A-D	High	Significant
Randall	@ Snyder			
	Snyder NB	A-D	High	Significant
24th	@ Central			
	24th WB	A-E	High	Significant
20th	@ Warren			
	20th WB	E-F	Moderate	Significant
24th	@ Carey			
	24th WB	A-D	High	Significant
20th	@ Snyder			
	20th WB	E-F	Moderate	Significant
20th	@ Pioneer			
	20th WB	E-F	Moderate	Significant
20th	@ Morrie			
	20th WB	E-F	Moderate	Significant
20th	@ Logan			
	20th WB	E-F	Moderate	Significant
	Logan NB	C-D	Moderate	Significant
20th	@ Central			
	20th WB	D-E	Moderate	Significant
20th	@ Evans			
	20th WB	D-E	Moderate	Significant
20th	@ Carey			
	20th WB	D-E	Moderate	Significant
16th	@ Ames			
	Ames NB	A-D	High	Significant
Prairie	@ Yellowstone			
	Prairie WB	C-E	High	Significant
Pershing	@ Converse			
	Pershing WB	A-C	Moderate	Significant

Table A.3-1 Continued, page 2 of 2
INTERSECTIONS THAT DECREASE IN LEVEL OF SERVICE

Location		Level of Service Reductions	Level of Impact	Significance
Pershing	@ Warren Pershing WB	E-F	Moderate	Significant
Pershing	@ Evans Pershing WB	F-F	Moderate	Significant
Pershing	@ Central Pershing WB	C-D	Moderate	Significant
Central	@ Yellowstone Yellowstone SB	E-F	Moderate	Significant
Dell Range	@ Powderhouse Dell Range WB	A-B	Moderate	Not Significant
Randall Gate	@ F.E. Warren AFB	Due to Queuing	Moderate	Significant
Randall	@ I-25 Interchange	A-D	High	Significant

APPENDIX B

APPENDIX B
DESCRIPTION OF DEFENSE ACCESS ROADS PROGRAM

This appendix gives a description of the Defense Access Road (DAR) improvement process as it pertains to the Peacekeeper in Minuteman Silos project.

B.1 Purpose

The purpose of this fact sheet is to provide an update on the DAR system as it pertains to the Peacekeeper in Minuteman silos project. (An explanation of the DAR system plus a summary of the Defense Access Road Needs (DARN) and program are in Attachment 1.) To better understand the entire system, certain terms are defined.

B.2 Definitions

The following are commonly used acronyms for the DAR program:

COE	Corps of Engineers
DAR	Defense Access Road
DARN	Defense Access Road Needs Report
DoD	Department of Defense
EIS(P,D,F)	Environmental Impact Statement (Preliminary, Draft, Final)
FHWA	Federal Highway Administration
LF	Launch Facility
MCP	Military Construction Program
MM	Minuteman
MTMC	Military Traffic Management Command
PIMS	Peacekeeper in Minuteman Silos
S/T	Stage Transporter
T/E	Transporter/Erector

Several agencies defined above have various responsibilities in the DAR process.

B.3 Responsibilities

B.3.1 General - From Inception Through Deployment

The initial description of the roads needed for Peacekeeper deployment was presented in the Air Force's DARN Report. As a preliminary Air Force facility need document, the DARN compares existing Minuteman T/E roads (their observed conditions) with the operational requirements (gross vehicle weight, grade, operating speed, turning ability, number of trips, etc.) of the Type II S/T. The Air Force DARN report and a technical summary of road needs (B-4 Specification from Martin Marietta Corp., designer of the S/T) were provided to the DoD MTMC, the agency responsible for managing transportation needs of the military. Ports, rail spurs and depots, and local non-DoD roads are examples of MTMC's traffic management support responsibilities. For local, county, and state roads requiring unusual military use, MTMC works through the FHWA, the federal focal point for road development in the United States.

Routine design construction/maintenance funds for roads are administered by the local/regional FHWA offices (Cheyenne, Wyoming, and Lincoln, Nebraska) which, in turn, request state highway/road departments to upgrade local roads to meet Air Force design requirements. The extent of DAR road upgrading is governed by a joint Air Force, MTMC, and FHWA assessment of Air Force operational road needs. See Table B.3.1-1 for interactions among agencies and their order of responsibility. Within the spirit of a cooperative interagency management process, actual local needs are weighted in the federal agency decisionmaking process as are the life cycle costs associated with the various road upgrading recommendations.

B.3.2 Road Maintenance Responsibilities

For extraordinary road maintenance to support Air Force site needs following the Peacekeeper's deployment, a program similiar to that used for Minuteman is anticipated. Site access for missile maintenance must accommodate sporadic, light, and heavy vehicle traffic. Under existing procedures, DAR maintenance funds are available for gravel roads only. The road use frequency for Air Force vehicles has not justified hard surfacing as an effective life cycle cost alternative for Minuteman. Where hard surface roads are used in the DAR network, their surface conditions are dictated by local needs rather than military needs. For those gravel surfaced local roads used by the Air Force to access missile facilities, the following gravel road maintenance procedures have been followed for Minuteman:

- o In the spring of each year, the base missile engineer drives the T/E routes, filing a report of resulting findings. Copies of these go to HQ SAC and the respective FHWA offices requesting a joint meeting to validate future DAR maintenance requirements.

- o Depending on the respective FHWA procedures for managing the DAR maintenance program, a joint Air Force/FHWA meeting is held to resolve future maintenance needs. The summary recommendation is forwarded by the local FHWA to its national office and by the base missile engineer through Air Force channels to MTMC.

- o Following MTMC review of the FHWA/DAR recommendation and in conjunction with Headquarters US Air Force, MTMC prepares a summary budget for Air Force roads.

- o The Air Force then includes DAR requirements as a separate operations and maintenance line item in the Defense Appropriation Bill presented to Congress.

- o Following Congressional approval, DAR funds are then available for transfer, at Air Force and MTMC direction, to the FHWA for road improvements. The FHWA is the agency assigned to insure that DAR work is accomplished in a satisfactory, timely manner.

Table B.3.1-1

DEFENSE ACCESS ROAD PROCEDURE MATRIX							
NEEDS / RESPONSIBILITY	US AIR FORCE	MILITARY TRAFFIC MANAGEMENT COMMAND	FEDERAL HIGHWAY ADMINIS-TRATION	STATE/LOCAL	CONGRESS	DESIGN CONTRACTOR	CONSTRUCTION CONTRACTOR
DEFENSE ACCESS ROAD NEEDS REPORT	1						
ROAD ASSESSMENT/ EVALUATION		3	2	1			
ROUTE SELECTION	4	3	2	1			
FUNDS	1	3	4	5	2		
ENGINEERING DESIGN				1		2	
REVIEW	3	2	1				
APPROVAL AND CONSTRUCTION		1	2	3			4
MANAGEMENT			2	1			
MAINTENANCE INSPECTION	1	4	3	2			
MAINTENANCE IMPLEMENTATION		1	2	3			4

NOTE: 1,2,3,4,5 represents order of responsibility.

B.4 Process

B.4.1 General

The DAR process is outlined in Figure B.4.1-1. A description of each block is shown below:

No.	Block	Description
1	Road evaluation needed by Air Force	Heavy, oversized vehicle proposed
2	Air Force initiates	Describes and recommends transportation requirements (i.e., road, structures)
3	MTMC Determines	Access road eligibility requirements
4	Transportation improvement needs	Rough cost estimate by MTMC
5	Recommended highway improvements to meet Air Force needs	Includes state and county input
6	Meets Air Force requirements	Includes Air Force review
7	Eligibility through DAR program	
8	Consideration of Air Force vs. civilian needs	
9	MTMC certifies as important to national defense	Letter of certification to FHWA
10	MTMC advises Air Force of funding requirement	
11	Supervises design, engineering, construction	
12	Monitors project funding progress	

The process is now at block seven. The remainder of the actions will be taken in the future months. The work on DAR and DoD roads is estimated to begin in the spring of 1985 and continue to the fall of 1987.

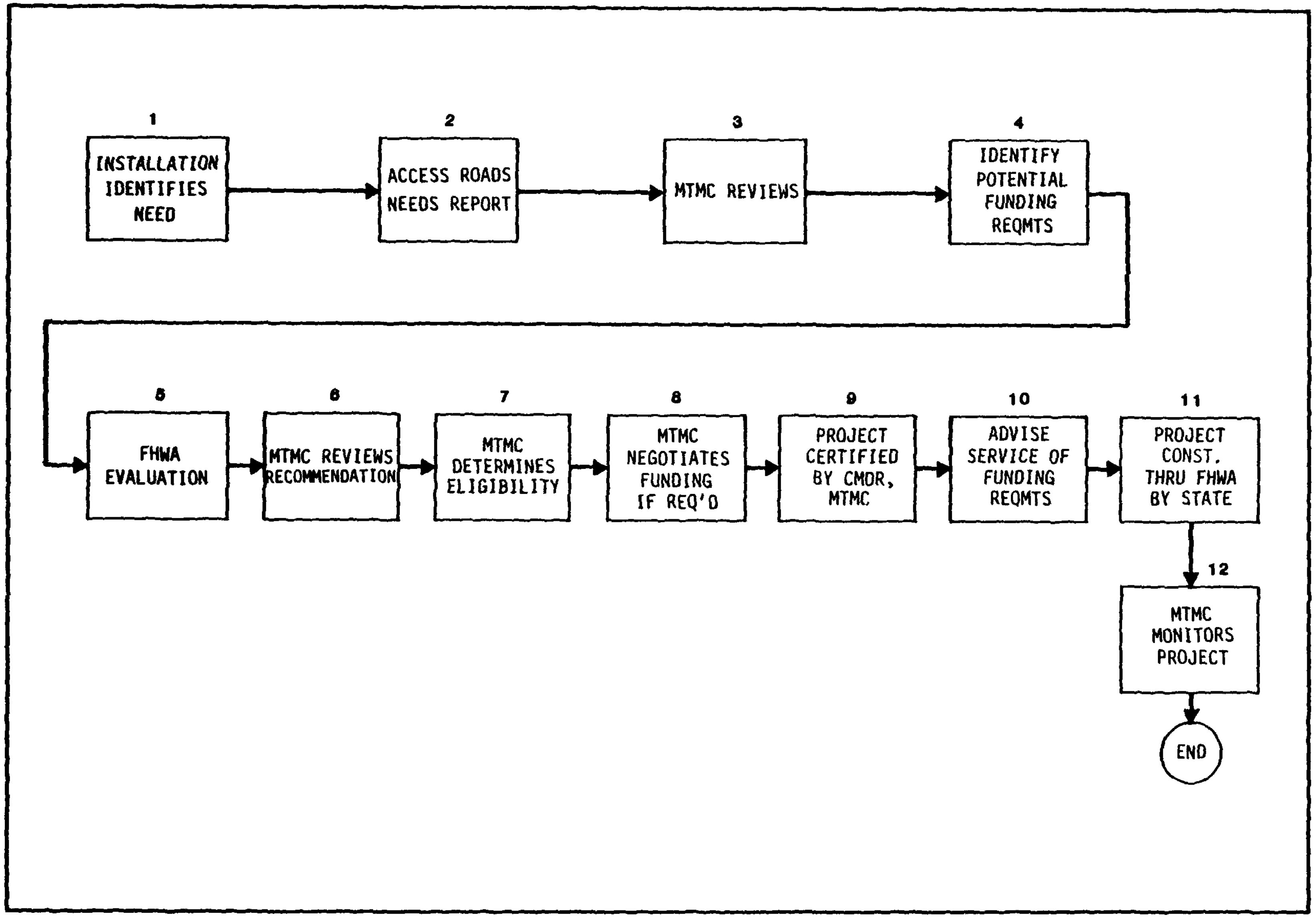


FIGURE B.4.1-1 DEFENSE ACCESS ROAD PROGRAM PROCEDURES

B.4.2 Defense Access Road Status

Several meetings were held to ensure smooth coordination. (Additional ones are planned.) They are summarized as follows:

- September 7, 1983: First Roads Working Group (RWG) Meeting - initiated dialogue with:

  - Military Traffic Management Command.

  - Federal Highway Administration.

  - State Highway/Road Departments (Wyoming/Nebraska).

  - U.S. Air Force (Air Force Regional Civil Engineer for Ballistic Missile Support, Headquarters Strategic Air Commmand, F.E. Warren AFB Missile Engineer).

- September 13, 1983: First Peacekeeper Working Group (PWG) Transportation Subcommittee Meeting. The meeting was held to establish dialogue between the Air Force and community services representatives (federal, state, and local) interested in the construction of Peacekeeper DARs. Representatives from the Air Force Environmental Planning Office (AFRCE-BMS/DEV), FHWA, the MTMC, and URS-Berger (the Air Force's environmental contractor for Peacekeeper in Minuteman Silos) presented a Peacekeeper DARN report overview to state, county, and community representatives from Wyoming and Nebraska.

- September 15, 1983: Second RWG meeting - defining the extent of work necessary to analyze the impact of Peacekeeper road needs on existing Minuteman roads. The Wyoming Highway Department (WHD) and Nebraska Department of Roads (NDOR) were asked by their respective FHWA offices to prepare a detailed cost analysis for Peacekeeper S/T roads as defined by the DARN report.

- September 29, 1983: Third RWG meeting - Representatives from WHD and NDOR provided preliminary cost estimates for preparing the Peacekeeper Road Needs Analysis. To assist the respective road departments with their analysis, the following information was provided by the Air Force representatives:

  - Bridge and road condition information collected by URS-Berger for the Air Force environmental impact statement (EIS) for Peacekeeper Missiles in Minuteman Silos.

  - B-4 road need specifications prepared by Martin Marietta Company.

  - Historic (1963) DAR information including copies of roads analysis prepared for Minuteman roads and as-built drawings of cattle crossings, concrete box culverts, structural steel pipe culverts, and typical road sections constructed for Minuteman.

- October 12, 1983: A planning meeting to assess the environmental performance capabilities of the Peacekeeper S/T vehicle (on Minuteman DAR) was held at F.E. Warren AFB. An onsite demonstration of the Peacekeeper S/T was planned for December 12 through 16, 1983.

- October 26, 1983: The Air Force initiated a study of onbase-road alternatives and their impacts on design considerations, construction costs, environmentally sensitive species habitats (Colorado butterfly plant), and historical and prehistoric cultural resources. A formal summary report and proposal were due back to the Air Force by November 30, 1983.

  Air Force representatives met with the WHD road planning engineers to review route alternatives for the Happy Jack Road alignment, connecting State Road 210 with the Missile Drive interchange at Interstate 25. A proposed route was coordinated with F.E. Warren AFB's Civil Engineer. The WHD is preparing a right-of-way easement request for submittal to base officials.

- November 9 through 10, 1983: Onbase Peacekeeper road needs were reviewed with the Base Facilities Board, HQ SAC representatives, Fish and Wildlife Service, Wyoming State Historic Preservation Office (SHPO), and the WHD Roads Planning Office representatives. The Base Facilities Board recommended a mitigation route be considered for the preferred alternative shown in the Draft EIS.

- November 18, 1983: A project book for 1984 construction of Peacekeeper roads on F.E. Warren AFB was distributed for Air Force internal review.

- November 30, 1983: Fourth RWG meeting - review of Preliminary DAR design considerations prepared by WHD and NDOR for the FHWA.

- December 1, 1983: Wyoming and Nebraska FHWA offices provided a summary recommendation for the Peacekeeper DAR report to the HQ FHWA, MTMC, Washington DC, and the Air Force Regional Civil Engineer for Ballistic Missile Support (AFRCE-BMS), Norton AFB, California.

- December 7, 1983: The second PWG subcommittee on transportation meeting was held in the Wyoming Highway Department Auditorium. AFRCE-BMS and FHWA representatives presented a Peacekeeper DAR Preliminary Engineering Analysis Summary.

- December 10, 1983: Following coordination with AFRCE-BMS, the MTMC will provide summary cost estimates for Peacekeeper DAR needs to Headquarters Air Force (HQ USAF/LEEC) for inclusion in the 1985 to 1990 Military Construction Program (MCP) forecast for congressional review.

B.5 Environmental Impact Statement Status

November 1 through 3, 1983	Public Hearings.
October 14 through November 28, 1983	Public comment period.
December 30, 1983	Preliminary Final EIS (PFEIS) completed.
January 31, 1984	Final EIS (FEIS) filed with the U.S. Environmental Protection Agency (EPA).

B.6 Conclusion

This fact sheet represents the latest actions on the DAR. It is intended to be an informational document. If you have questions or comments, contact Major Torgenson, AFRCE-BMS/DDEV, Norton AFB, CA 92409, (714) 382-4891.

ATTACHMENT 1: DAR SYSTEM, DARN REPORT SUMMARY, DAR SUMMARY

1.0 DAR SYSTEM

During the 1960s, Minuteman T/E route requirements were developed to assure the T/E would safely travel from F.E. Warren AFB to each of the launch sites by the most reasonable direct route. The public roads along these routes were upgraded through the DAR program by the local road agencies under the guidance of FHWA. When new roads were needed to connect the DARs to the Launch Facilities (LFs), a DoD road was built under the MCP by the U.S. Army Corps of Engineers. Maintenance to the DAR system is funded by the Air Force.

2.0 DARN REPORT SUMMARY

2.1 Introduction

F.E. Warren AFB has been selected by the President as the support base for 100 Peacekeeper missiles which will be placed in existing Minuteman silos. The deployment will require several new support facilities at the base, modifications to each of the 100 selected Minuteman LFs to accept the Peacekeeper missile, and new transporter vehicles to move the Peacekeeper missile in stages to the base and from the base to the LFs.

Peacekeeper missiles will replace 100 Minuteman missiles in two squadrons of the 90th Strategic Missile Wing at F.E. Warren AFB, Wyoming. The two squadrons are the 319th Strategic Missile Squadron (SMS) which encompasses Flights A through E, and the 400th SMS which encompasses Flights P through T (Attachment 1: Figure 1).

2.2 Objective

The objective of the DARN report was to present Air Force roadway needs and a preliminary evaluation of the existing Minuteman T/E routes to support the Peacekeeper mission. Through this process, suspected roadway problems were identified.

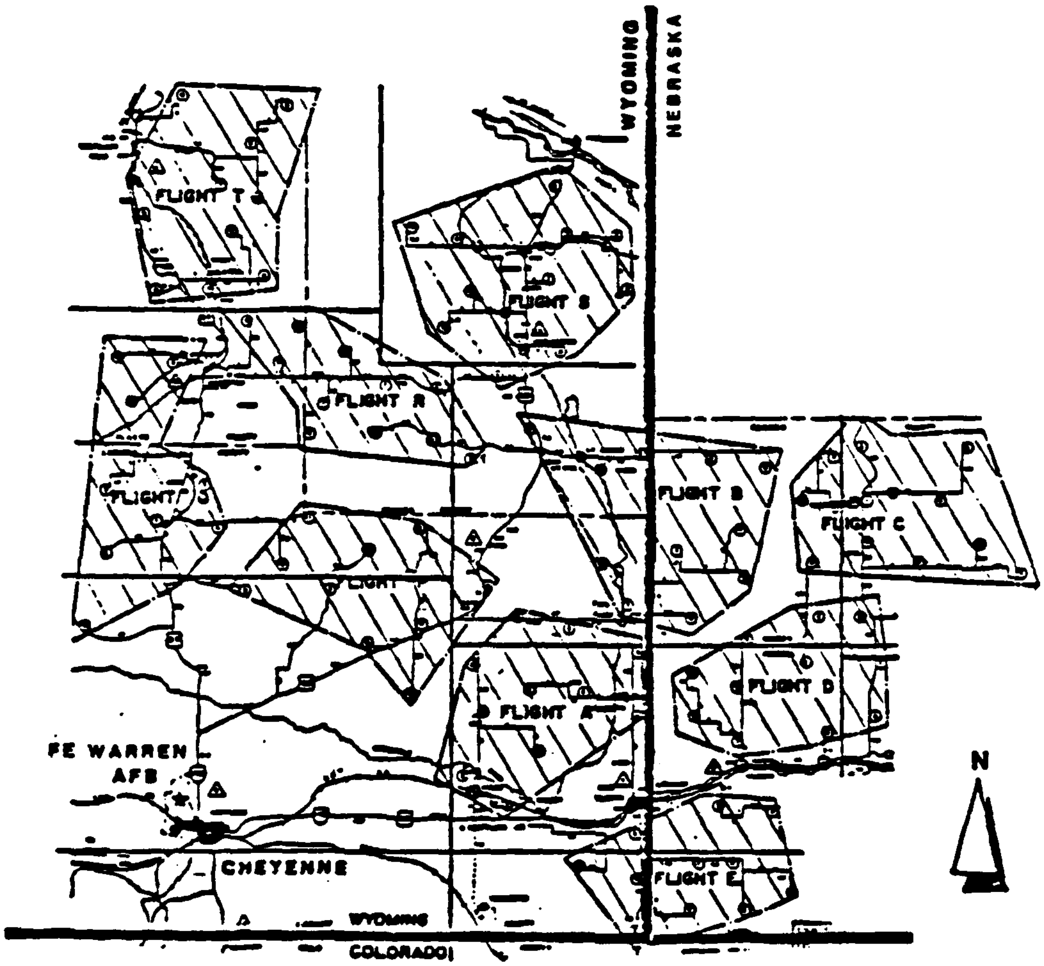
2.3 Assumptions

Certain assumptions were considered in the preparation of the DARN report. They are as follows:

- This report was based on a Peacekeeper Weapon System Baseline Concept Description for Basing in Minuteman Silos, June 1983.

- The Peacekeeper missile will be transported to the LF in four separate stages plus the Reentry System (RS). All of the individual stages and the RS will be transported by the Peacekeeper Type II S/T from F.E. Warren AFB to the LFs.

- Design of an emplacer vehicle has not been defined nor approved. For purposes of this evaluation, it was assumed to be no wider than 14 feet. It was to have a gross vehicle weight of no greater than 105,000 pounds.



ATTACHMENT 1: FIGURE 1: PEACEKEEPER DEPLOYMENT AREA

- The road needs in this report will be verified through an evaluation process by the MTMC, the FHWA, the Department of the Air Force, and the state and local transportation departments in the summer and fall of 1983.
- The Peacekeeper S/T will travel the existing Minuteman T/E routes except where changes are necessary.
- Wheel and axle loads of all Peacekeeper vehicles will not exceed the wheel and axle load of the Peacekeeper S/T.
- The T/E routes on secondary (Nebraska, Wyoming, and county paved and gravel) roads could require upgrading to support the Peacekeeper deployment.
- A canister vehicle will be designed which presently has not been defined or approved. It was assumed to have a gross vehicle weight of no greater than 180,000 pounds.
- It is assumed prudent to upgrade the road systems to a degree that would assure a 75 percent all weather surface. A higher degree of reliability would require major road reconstruction.
- Roads within the 1,050 foot Quantity Distance (QD) envelope of the LF will be waivered.

2.4 Project Scope

The current Peacekeeper program calls for the construction of support facilities at F.E. Warren AFB and the Deployment Area (DA) starting in 1984 and continuing through 1989. Launch Facilities modifications will start in 1986. Bridge and road improvements required by this project should be completed prior to deposturing activities. Bridge and road improvements on the road network will begin in 1985. All 100 missiles are programmed to be fully operational in late 1989.

The road needs which the DARN report reflects are based on what the Peacekeeper traffic will be in terms of volume and types of vehicles. This information, as well as the Assembly and Checkout (A&CO) activities, movement of Peacekeeper missile components, and Peacekeeper route identification, is detailed in the DARN report.

2.5 Scheduling

Specific LFs have been identified for modification. This information is available for scheduling future Peacekeeper roadwork.

2.6 Recommendations

- A thorough engineering analysis must be made of the T/E routes. This should cover roadways, bridges, and other structures.
- An engineering analysis may need to be made of non-T/E routes which may be significantly impacted by construction activities in support of Peacekeeper deployment activities.

- Definite control should be specified for the construction procedures and the quality of road building materials. These controls shoulc be specified in the agreements and should include gravel, asphalt, concrete, structures, and other features.

3.0 DEFENSE ACCESS ROAD PROGRAM

The U.S. Air Force initiated an access road needs report and requested traffic and road engineering services from the Military Traffic MTMC.

The MTMC, acting through the FHWA and the local road authorities, is determining provisions for needed work.

3.1 Authority

United States Code, Title 23, Highways, authorizes expenditure of federal funds on the public highway system. Section 210 of this code covers the following:

- Authorizes the Secretary of Transportation to provide for construction of access roads, certified as important to national defense by Secretary of Defense.

- Projects are administered under Federal-Aid Highway procedures through the Federal Highway Administration for the Department of Transportation.

DoD Directives and Joint Service Regulations.

- Delegates Defense authority for the program to Commander, MTMC. (Similar delegation of authority is made from the Secretary of Transportation to the Federal Highway Administrator.)

- Commander, MTMC, is Secretary of Defense's executive agent for public highway matters.

- Each service programs and budgets for access road needs.

3.2 Policy

- State/local highway agencies are responsible for constructing and maintaining highways, including those for defense needs.

- Defense-generated traffic produces the same road-user taxes as other traffic. (This does not apply to government-owned vehicles.)

- Defense expects due priority consideration in civil highway programs.

- However, Defense can create sudden/unusual impacts on highway programs. For example:

  - New base or expansion of an existing base.

- Low grade roads may need immediate upgrade due to defense requirements.

- Replacement roads.

- Repair or strengthening of maneuver or exercise roads.

o Provides means to pay fair share for public highway improvements.

3.3 Roles

o The role of Military Traffic Management Command (Defense Executive Agency) is to:

  - Review incoming Needs Report and determine legitimacy.

  - Recommend to services initial access road funding level.

  - Request FHWA evaluation.

  - Determine Access Road eligibility.

  - Commander, MTMC, certifies as important to national defense.

  - Authorizes expenditure of funds.

  - Monitors project.

o The role of the FHWA (Joint Administration with MTMC) is to:

  - Evaluate public highway needs upon MTMC request.

  - Recommend improvements and estimate costs.

  - Supervise design, engineering, and construction.

  - Administer expenditure of funds.

o The role of the services is to:

  - Review its installations needs.

  - Determine funding capability and program funds.

  - Coordinate in MTMC eligibility determination.

  - Transfer funds to FHWA.

APPENDIX C

APPENDIX C
GRAVEL ROADWAY MAINTENANCE COSTS

C.1 Description of Analysis Procedure

Because of the high probability of increased maintenance requirements on gravel roadways maintained by the five affected counties, the following analysis was conducted to further define potential cost impacts. The five affected counties (Laramie, Goshen, and Platte in Wyoming, and Kimball and Banner in Nebraska) were investigated and interviews were held with maintenance personnel in an attempt to consider local conditions and methods to a large extent.

C.1.1 Methodology

During data gathering for this effort it became clear that there were several important factors which influenced maintenance costs. Following is a summary:

1) Total number of miles of roadway to be affected by classification;
2) Roadway classification or section;
3) Weather (snow removal, rain, wind) and mowing;
4) Non-roadway maintenance such as drainage, structures, etc.;
5) Frequency of blading and other maintenance;
6) Salary and benefit costs;
7) Productivity;
8) Equipment size and capacity; and
9) Average daily traffic volume and makeup.

Based on information obtained from roadway supervisors and foremen in all 5 counties, it was apparent that none of the counties would be able to absorb the increased maintenance required during construction without serious neglect of other roadways. As such, the following factors were chosen for consideration in this analysis: total number of grading miles; productivity in number of grading miles per person/machine month; and cost per month including labor, equipment, and operating costs.

C.1.2 Assumptions

For this preliminary analysis, several important assumptions were made. Following is a partial list:

1) Only gravel roads were analyzed;
2) All gravel roads affected would be E-1 or better roadways prior to use by construction-related traffic;
3) ADT due to reconstruction of any one silo would total 20 vehicles per day over the 3.5 month construction period;
4) Four bladings per affected roadway per silo would be required during the 3.5 month construction period;
5) Equipment (Caterpillar 140G motor grader with roll over protection and certain other extras) would be leased on a monthly basis from local equipment suppliers;
6) Average productivity for blading is 80 miles of graded 2-way roadway per month; and
7) Operating costs of $15.00 per hour include all variable costs of operation for a unit of less than 1 year old.

Following are the results of this analysis based on the following Flight construction schedule:

1986 - P, Q
1987 - T, R, S
1988 - B, C, D
1989 - E, A

Since the "affected miles" column actually represents person-months, it is evident that staffing increases will be temporary, full-time positions. For further details of this analysis, see Section C.1.

County	Affected Miles $^{x4}/80$	Monthly Cost (1983 $)	Cost by Year (1983 $)
Goshen	8.55	9,325	1987 = 63,783* 1988 = 15,946*
Kimball	4.75	8,900	1988 = 21,138 1989 = 21,137
Laramie	8.00	9,672	1986 = 44,104 1989 = 33,272
Banner	4.30	9,100	1988 = 39,130*
Platte	6.75	9,523	1986 = 12,856 1987 = 51,424

C.2 Detailed Analysis by County

Following is more detailed information regarding project-induced gravel road maintenance costs. Major areas of investigation include number of miles affected, frequency and intensity of maintenance, productivity, and equipment, labor, and operating productivity, and equipment, labor, and operating costs.

C.2.1 Number of Miles Affected

The number of miles of roadway affected is a function of silo location and distance from the nearest paved roadway. Miles of roadway affected is presented here as if each silo were located on its "own road" i.e., it includes multiple counting of links which service more than one silo. This method was used because the incremental demands for maintenance due to construction traffic are additive in nature. Following are the results:

County	# of Miles of Roadway Affected
Goshen	171
Kimball	95
Laramie	160
Banner	86
Platte	135

C.2.2 Frequency and Intensity of Maintenance

Based on information provided by Kimball, Banner and Goshen counties, it was determined that, on the average, an increase of approximately 150 vehicles per day (ADT) equates to a requirement for blading of once per week. Based on data provided by the Description of Proposed Action and Alternatives of 11/11/83, the construction period for any one silo was approximately 15 weeks. Based on information provided by the transportation resources group, an average ADT of 20 vehicles per silo was assumed for the entire 15 week per silo construction period. Based on these assumptions and equally roadway destructive traffic mixes, the following assumption was made.

$$\frac{150 \text{ ADT}}{20 \text{ ADT}} = 1 \text{ grading each 7.5 weeks}$$

$$= 2 \text{ gradings per silo per construction period.}$$

Since the truck mix for silo construction was estimated to be approximately twice as great as normal traffic, construction-related maintenance requirements were presumed to be four bladings per construction period.

C.2.3 Productivity

Although productivity in terms of numbers of miles of roadway bladed per day is highly variable, interviews with both foreman and operators suggested that, based on E-1 or better roadways of 24 to 30 foot width and use of a Caterpillar 140G motor grader, an average productivity for a single machine and operator of 4 miles of 2-way roadway per day and 80 miles per month would be representative.

C.2.4 Costs

Since it was apparent that increased road maintenance demands for each county would require one full-time equivalent operator and machine or less and vary with time of year, a monthly cost approach was developed. Cost components include labor, and fixed and variable equipment costs. No materials would be required.

Labor costs were determined by county and benefits were calculated at 25% of salary. Following are the results.

County	Labor Costs Per Month
Banner	$1,400
Kimball	1,200
Goshen	1,625
Laramie	1,972
Platte	1,823

Operating costs (variable) were presumed to be $15.00 per hour for all variable operating costs, based on Rental Rate Blue Book operating costs for a Caterpillar 140G motor grader. Based on 160 hours per month, total monthly cost equates to $2,400 per month.

Fixed costs for equipment were assumed to be $5,300 per month for a Caterpillar 140G including sales tax. This figure was obtained from an equipment supplier in Scotts Bluff. Following is a summary of total monthly costs.

County	Monthly Cost (1983 $)
Goshen	9,325
Kimball	8,900
Laramie	9,672
Banner	9,100
Platte	9,523

APPENDIX D

APPENDIX D

METHODOLOGY FOR DETERMINING MAN-HOUR REQUIREMENTS FOR ROADWAY IMPROVEMENTS

Based on roadway needs reported in the Defense Access Roads study, estimates were made of roadway materials quantities. It was then necessary to determine the man-power requirements associated with this work. The following methodology was used.

- The cost of supplying and placing asphalt concrete is typically about \$30 per ton. Of this, the labor cost is about \$7.
- Using \$19 as an hourly labor cost, about 0.368 hours of labor would be necessary for each ton of asphalt.
- Asphalt concrete weighs about 110 lbs for each 1-inch depth per square yard. (This is, a square yard of material 1-inch thick). Thus a 36 inches depth, equivalent to 1 cubic yard, would weigh 3,960 lbs, or 2 tons.
- Thus the labor associated with 1 cubic yard (cy) is equal to the labor to do 2 tons. As explained above, the labor for 1 ton is 0.368 hours, so the labor for 2 tons (1 cy) is 0.73 hours.
- The labor required for aggregate surfacing is estimated at about 80 percent of that required for asphaltic concrete. Thus one cy of aggregate will require 0.73 hours x 0.8 = 0.6 hours.

APPENDIX E

APPENDIX E

MEMORANDUM FROM THE FEDERAL HIGHWAY ADMINISTRATION DIVISION ADMINISTRATION CONCERNING DEFENSE ACCESS ROAD IMPROVEMENTS

Appendix E contains a memorandum from the Federal Highway Administration Division Administrators for Wyoming and Nebraska to the Direct Federal Program Administrator in Washington.

U.S. Department
of Transportation
Federal Highway
Administration

Memorandum

Subject: Peacekeeper ICBM Deployment - Wyoming and Nebraska - Road System Evaluation

Date: December 7, 1983

From: F. L. Cooney, Division Administrator
Cheyenne, Wyoming
Ray Hogrefe, Division Administrator
Lincoln, Nebraska

Reply to Attn. of: HPD-WY
HDA-NE

To: Mr. Thomas Edick
HDF-13 Direct Federal Program Administrator
Office of Direct Federal Programs

This is in response to the August 17, 1983 request for an independent evaluation of the access road needs of the Peacekeeper Missile System.

FHWA's evaluation of the access road needs has involved three phases. First, coordination activities were necessary to better define Air Force needs. The second phase was the coordinated preparation of a needs report by Nebraska and Wyoming. Finally, phase three was FHWA's review and evaluation of the State reports of which this response represents the interim completion. All three phases were completed within the short time frame of three months and required a considerable time commitment including several coordination meetings with State, County, Air Force, and MTMC personnel.

Each state has prepared a report on our request which includes construction improvement options providing different levels of service. These two reports are included with this submission. Proposed improvements and the resultant costs are based on a broad level of analysis. It is understood that detailed engineering design will produce project level variations to the general assumptions and proposals made in these reports.

Early coordination meetings identified difficulties in determining the level of traffic service considered necessary by military users of the access roads. Following discussions on this point, as well as others, certain "common parameters" were agreed to and communicated to all parties. Although these parameters are included in each state report, below is a summary:

1. State proposals should reflect a better road system than the existing T-E system.

2. Minimum AASHTO standards would be used in developing roadway section recommendations. This is further substantiated by the fact that both Wyoming and Nebraska policy requires these minimum standards when improvements are to be undertaken.

3. Cost estimates involving pipe culverts were based on inventory data supplied by URS Berger. A standard improvement cost was used for all culverts 36 inches or less with 2 ft or less of cover.

4. Cost estimates involving structures (over 20 ft in length) were based on state inventories. For consistency, each state estimate assumes impact loading.

5. The design vehicle was the Type II Stage Transporter with loadings as shown in the attached drawing (Attachment 1).

Wyoming

The State's report is based on the existing T-E road system but analyzes an additional 32 miles of possible alternate routes for consideration by the road users. In addition, an appraisal was made of routes which would not be traveled on by the T-E vehicle but would serve an important role in the security surveillance and the construction of the missile sites.

Wyoming's analysis indicates that the existing T-E routes are, to a large extent, on the State highway system and already largely paved. The report summarizes that, of the total 607 miles of T-E routes, approximately 320 miles are on the State system and 425 miles are now paved. Approximately 287 miles are on the County system of which 105 miles are now paved.

The Wyoming report presents three basic improvement alternates with additional life cycle-surface cost comparisons provided in separate appendices.

Nebraska

In their report, the State determined necessary system changes and then identified needs on assumed approval of the changes. The changes result in a net addition of 16.7 miles of county roads to the Nebraska system.

Nebraska has a much less extensive State highway system than Wyoming. Because of this, the Nebraska report basically recommends paving additional county roads rather than strengthening existing State paved roads as in Wyoming. Alternate 6, for example, indicates paving of 84.6 miles of existing gravel county roads. Presently, none of the county roads on the T-E system are paved.

The Nebraska report presents nine construction options with life cycle and other cost information associated with each. Option nine was added at the request of the Air Force to show gravel-only improvement costs on the existing T-E system.

FHWA Evaluation

Attachment 2 provides a summary of two alternates from both Wyoming and Nebraska. Costs are split to indicate those expected to be the responsibility of the Air Force (capital improvement and periodic regraveling) and those expected to be the responsibility of others (routine maintenance). Immediate road needs to handle the planned launch facility modifications are estimated to cost $72 - $77 million in Wyoming and $20 - $26 million in Nebraska.

In Nebraska, Alternate 6, paving 84.6 miles of county roads, results in a reasonably consistent ratio of paved to gravel roads compared to Wyoming. Even though 16 of the Nebraska missile sites would still be served by a gravel surface substantially the same as today, the total travel on gravel roads would be significantly reduced even for access to these sites. After 20 years, the paved roads will require costly rehabilitation by the counties, which have limited resources.

For an additional cost of $5.6 million, the entire access road system in Nebraska can be paved. The 20-year life cycle costs indicate that the Air Force costs would be approximately the same for either Alternate 2 or Alternate 6. On this basis, the Nebraska Department of Roads recommends Alternate 2. To the Nebraska Division Office, either Alternate 2 or Alternate 6 would suffice.

Alternate 6 is entirely acceptable to Kimball and Banner Counties in Nebraska. Anything less would be opposed through their Congressional Delegation. They will accept the additional paved road maintenance responsibility and have passed resolutions to that effect.

In Wyoming, Alternate 1, which basically results in no additional paved roads, is the preferred choice of the Wyoming Highway Department. This alternate is acceptable to Goshen and Platte Counties, but not to Laramie County, which prefers that all T-E routes be paved. In an analysis of those routes serving three or more missile sites, all routes fitting this criteria are already paved (with the small exception of Link 185 in Laramie County). Although this "trunk of the tree" analysis was not a specific criteria in developing the alternates, it is an indicator of system functional classification.

For an additional cost of $5.3 million, the remainder of 182 miles of county roads in Wyoming could be paved. Considering regraveling three times over a 20 year period, projected Air Force costs would be higher for Alternate 1 by $6.4 million. With maintenance costs projected, the two alternates are very close. However, of primary importance is the additional heavy maintenance responsibilities placed on the counties under Alternate 3. The Wyoming Division Office concurs in the Wyoming Highway Department's preference for Alternate 1.

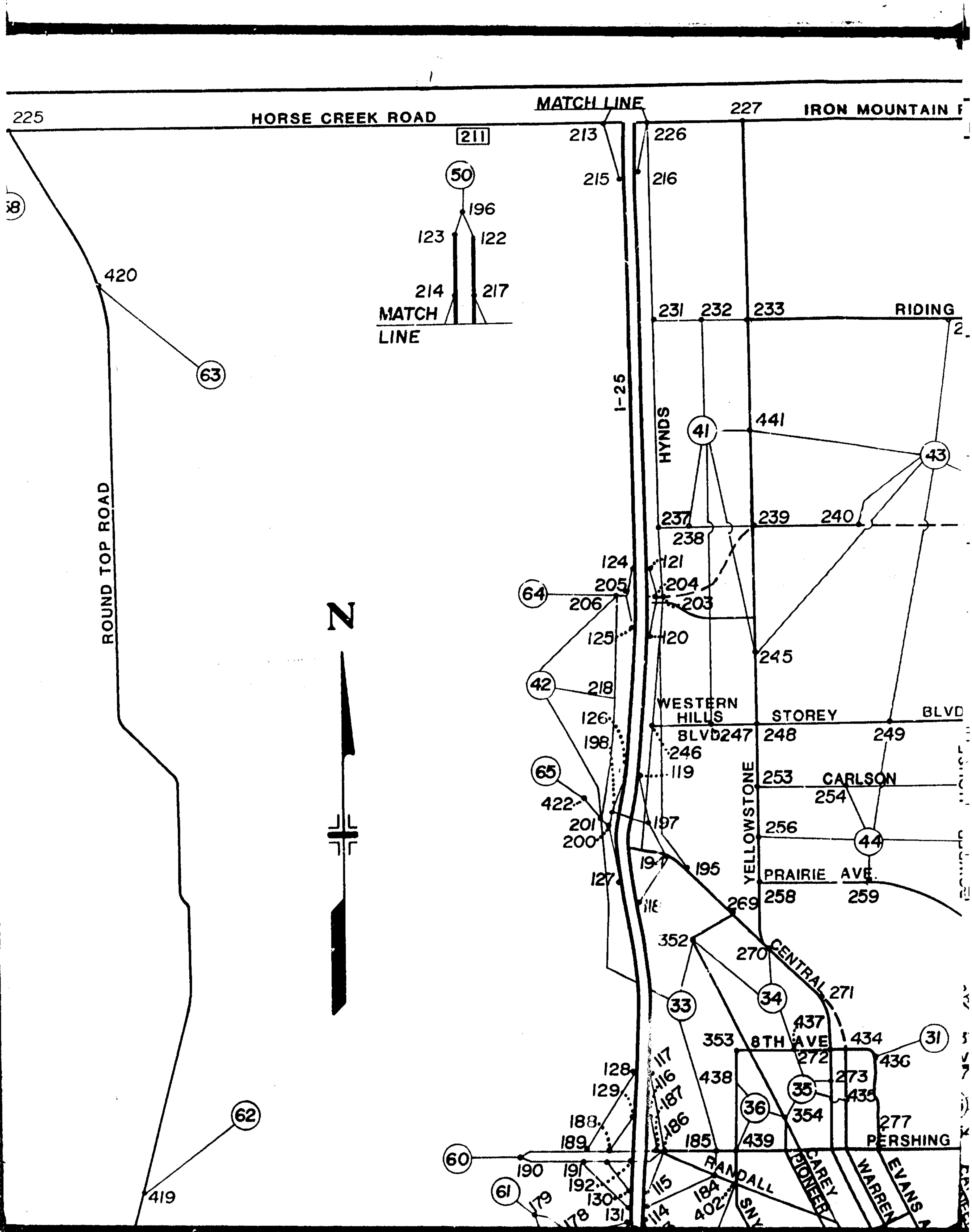
An additional analysis was performed in Wyoming following submittal of the State report and receipt of priority missile site deployment from the ARFCE-BMS/DEVP on December 2, 1983. This information is shown in Attachment 3. Based on this anticipated deployment schedule, costs by link were summarized for the "First 10 Sites" and "Second 10 Sites". These costs total $14.4 million and $7.7 million respectively for Alternate 1. Because links were not grouped to produce the most cost effective project development, these costs should only be considered preliminary. For example, in considering improvements for deployment of Site P-7, it may be advantageous to make improvements leading to Site P-10 in the same contract.

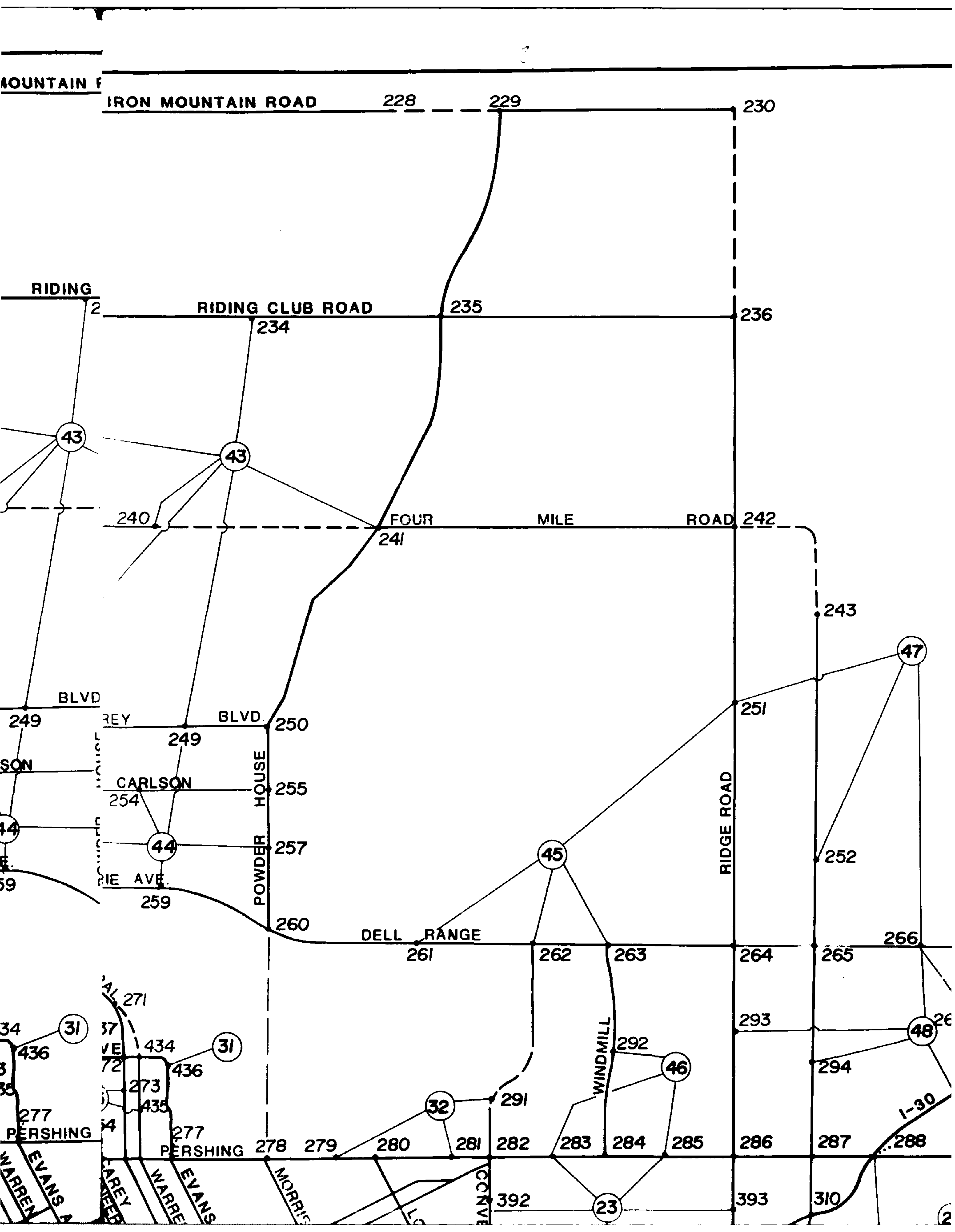
In summary, we consider Alternate 1 in Wyoming and Alternate 6 in Nebraska to represent the best improvement alternates considering all factors. In addition to minimum cost, other factors which were strongly considered included compatibility with adjacent State's roadway surfacing, Peacekeeper deployment related traffic, county maintenance commitment, and road accessability.

A further explanation is in order regarding development of the typical roadway sections in Wyoming and Nebraska. As the two State reports indicate, differences do occur in roadway section design which was assumed for preliminary estimate purposes. We do not see this as a problem, however. Because of the limitations of time and data placed on development of estimates, some differences were expected. We propose that, at the preliminary design phase, uniformity of roadway sections will be developed. For purposes of the estimates made here, total consistency in roadway sections was not necessary as there are variables which will occur in roadway design.

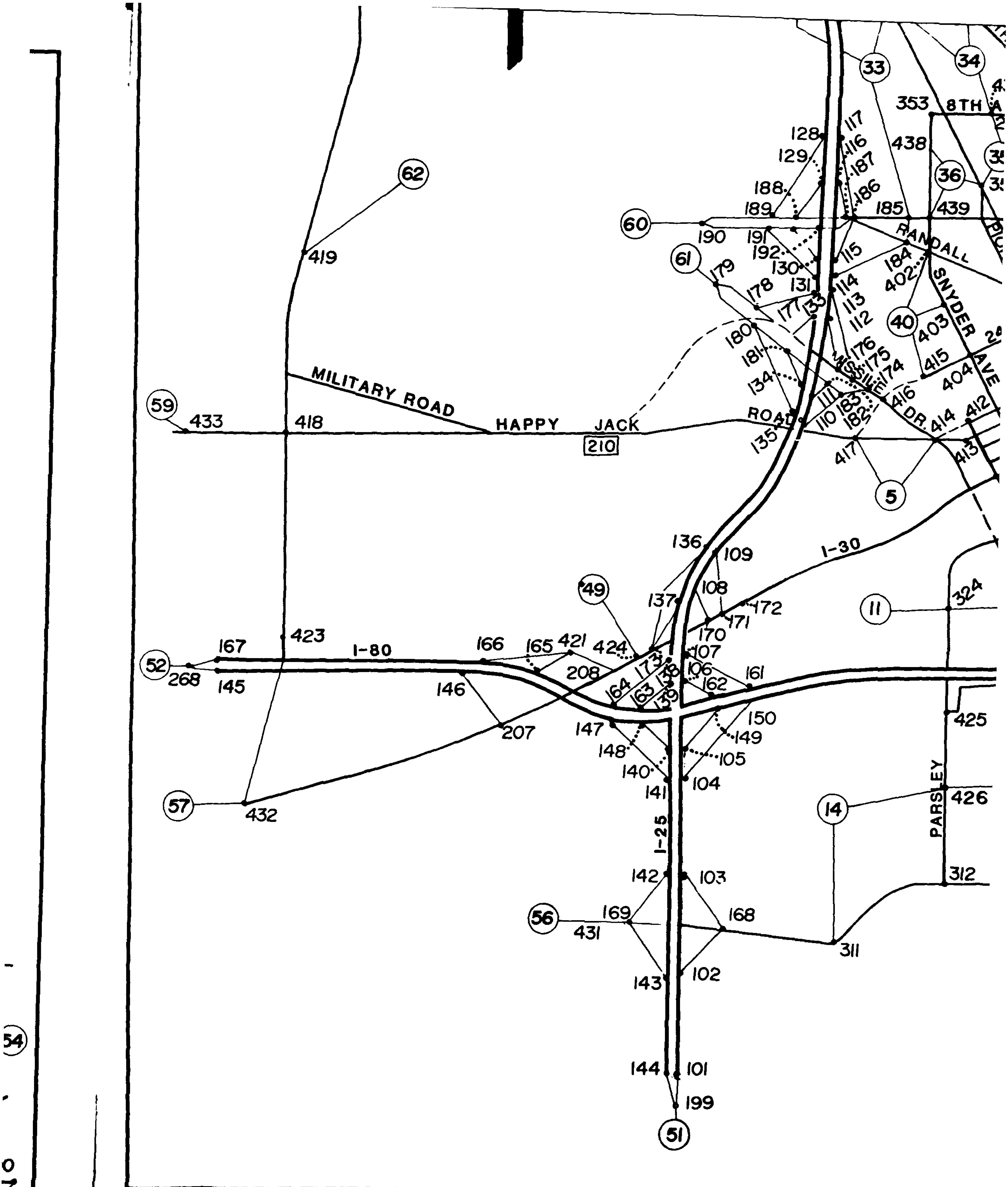
Additionally, we are suggesting that, at the point of preliminary design, careful consideration be given to identifying and utilizing existing gravel in place. Although not presented in either State report, we also suggest that options be considered for stabilization of the existing gravel (and/or subgrade) by means of road-mixing with a stabilizing agent such as cement or fly ash. This method could possibly save funds and reduce future maintenance as well as prevent rutting which could result on asphalt surfaces. Stabilizing could reduce grading and other miscellaneous costs as well as minimize the depth of asphalt concrete overlay. This procedure would help conserve good aggregate materials that will be needed in the future for higher type facilities.

In order to accomplish the deployment schedule established by the Air Force, it is imperative that the Wyoming Highway Department b authorized to proceed with preliminary engineering at the earliest possible date. Even if the authorization could be limited to data collection until type of work was identified, this would expedite the necessary steps prior to construction. Because of the extent of work required, it is essential that preliminary efforts be undertaken as soon as possible particularly on structures.


HORSE CREEK ROAD
MATCH LINE
IRON MOUNTAIN
211
225
213
226
227
215
216
50
196
123
122
420
214
217
MATCH LINE
231
232
233
RIDING
63
ROUND TOP ROAD
I-25
HYNDS
41
441
43
237
238
239
240
124
121
64
205
204
206
203
125
120
245
N
42
218
WESTERN HILLS BLVD
STOREY
BLVD
126
247
248
249
198
246
65
119
YELLOWSTONE
253
CARLSON
254
422
201
197
256
44
200
194
195
PRAIRIE AVE.
127
258
259
118
269
352
270
CENTRAL
271
33
34
437
353
8TH AVE
434
31
272
436
128
117
116
438
273
129
187
35
435
188
36
354
186
277
189
185
439
PERSHING
60
RANDALL
CAREY
PIONEER
WARREN
EVANS
190
191
192
115
184
61
179
130
402
178
131
114
62
419



IRON MOUNTAIN ROAD
MOUNTAIN
228
229
230
RIDING
RIDING CLUB ROAD
234
235
236
43
43
240
FOUR MILE ROAD
241
242
243
47
BLVD
249
BLVD.
249
250
251
SON
CARLSON
254
255
RIDGE ROAD
POWDER HOUSE
44
44
257
45
252
259
259
260
DELL RANGE
261
262
263
264
265
266
271
31
434
31
436
436
WINDMILL
292
46
293
48
294
273
435
277
277
32
291
PERSHING
PERSHING
278
279
280
281
282
283
284
285
286
287
288
I-30
WARREN
EVANS
CAREY
WARREN
EVANS
MORRIS
392
23
393
310



TRAFFIC ZONES AND NODES IN THE CHEYENNE AREA

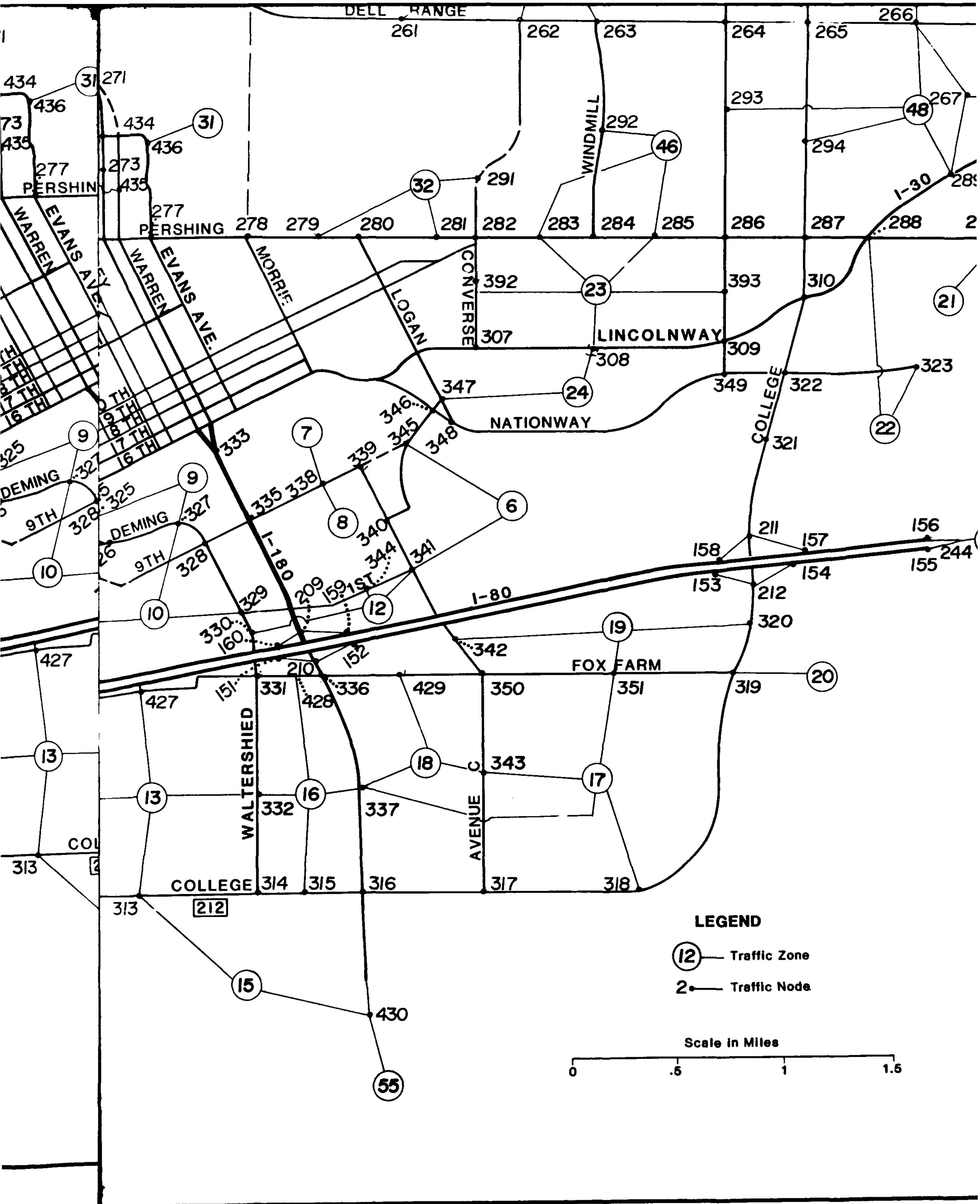
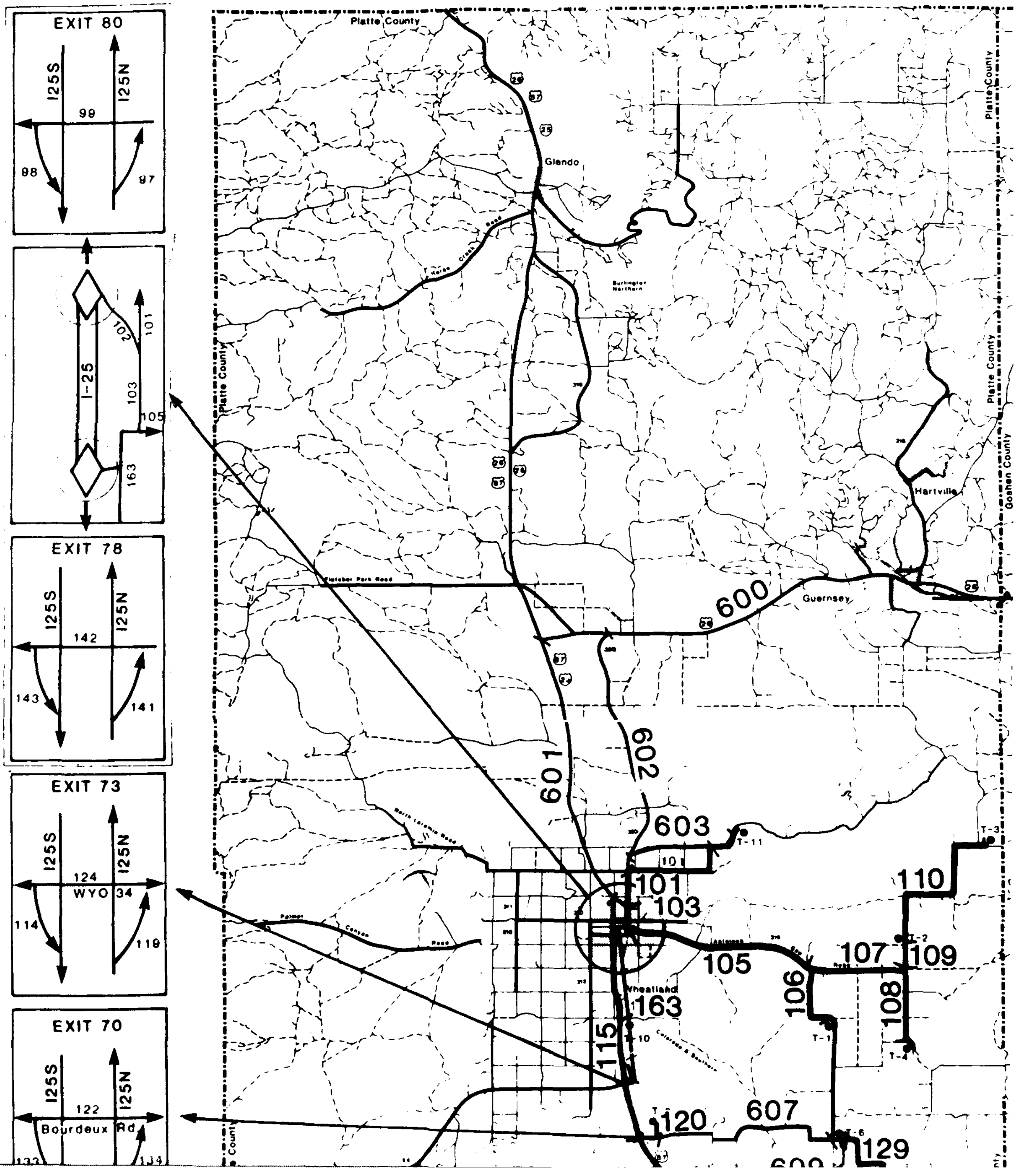
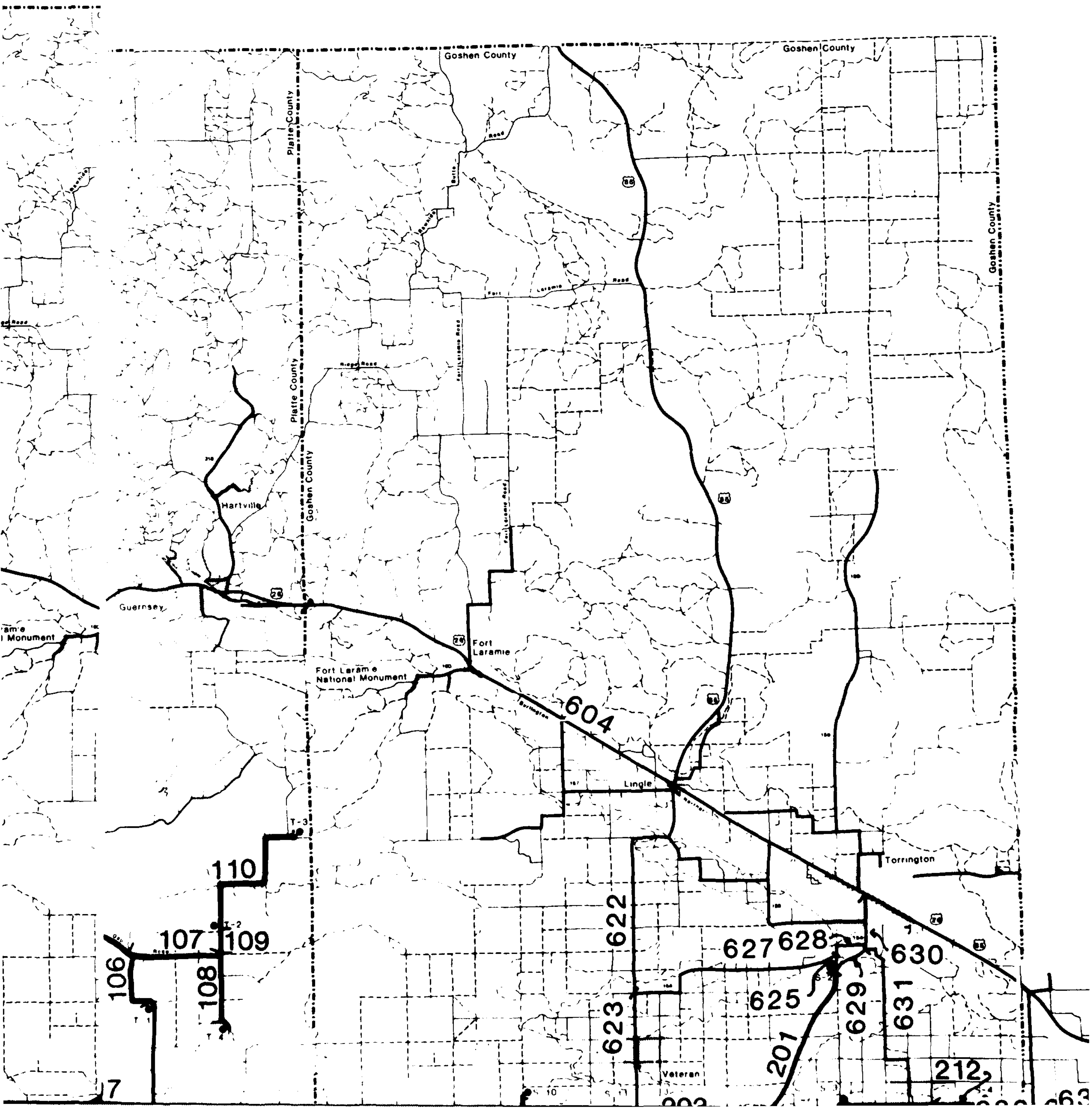

DELL RANGE
PERSHING
WARREN
EVANS AVE.
MORRIE
LOGAN
CONVERSE
WINDMILL
LINCOLNWAY
NATIONWAY
COLLEGE
I-30
I-180
I-80
1ST
9TH
DEMING
16 TH
17 TH
18 TH
19 TH
FOX FARM
WALTERSHIED
AVENUE C
COLLEGE
212
LEGEND
Traffic Zone
Traffic Node
Scale in Miles
0
.5
1
1.5

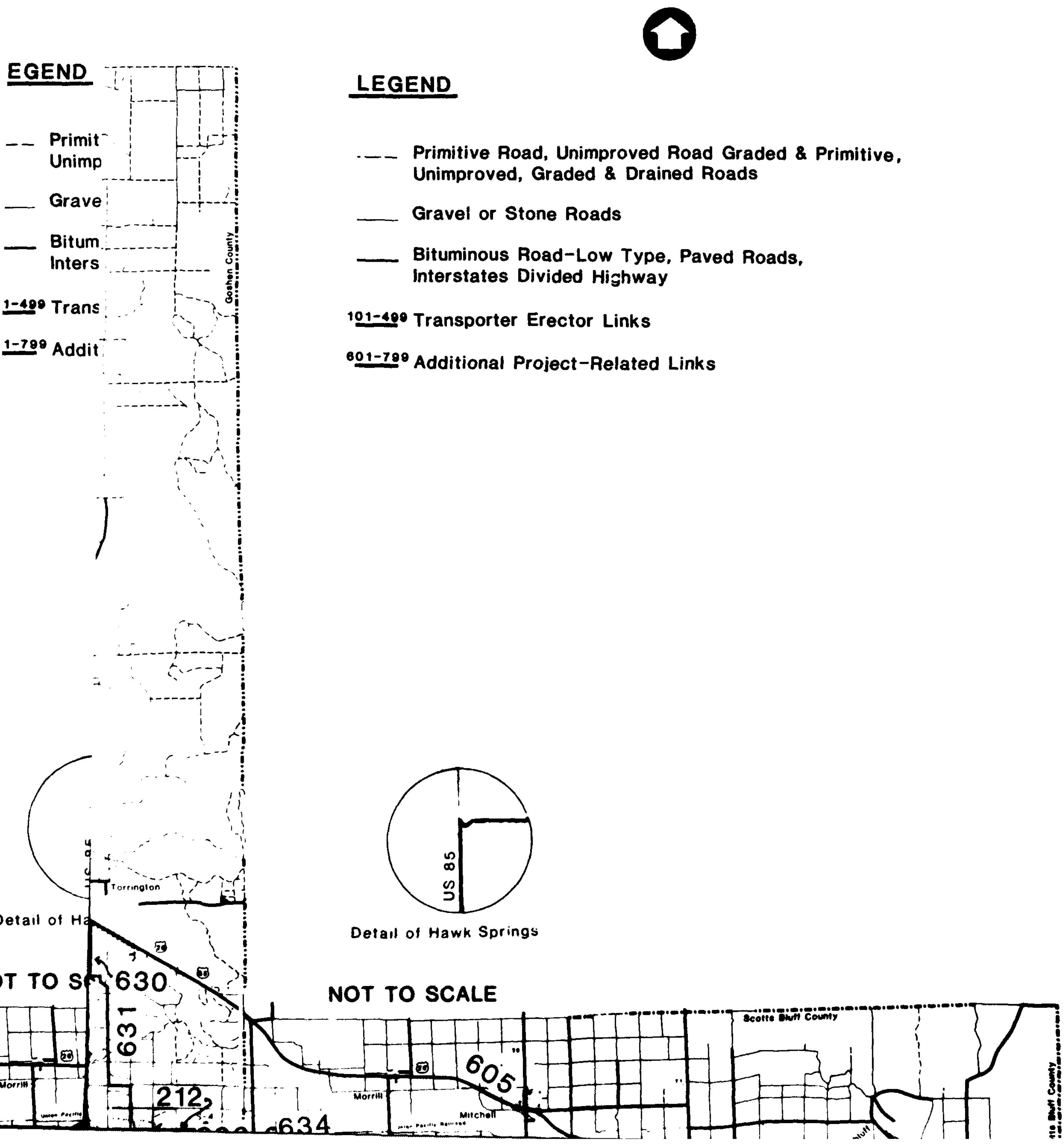
FIGURE NO. 2.

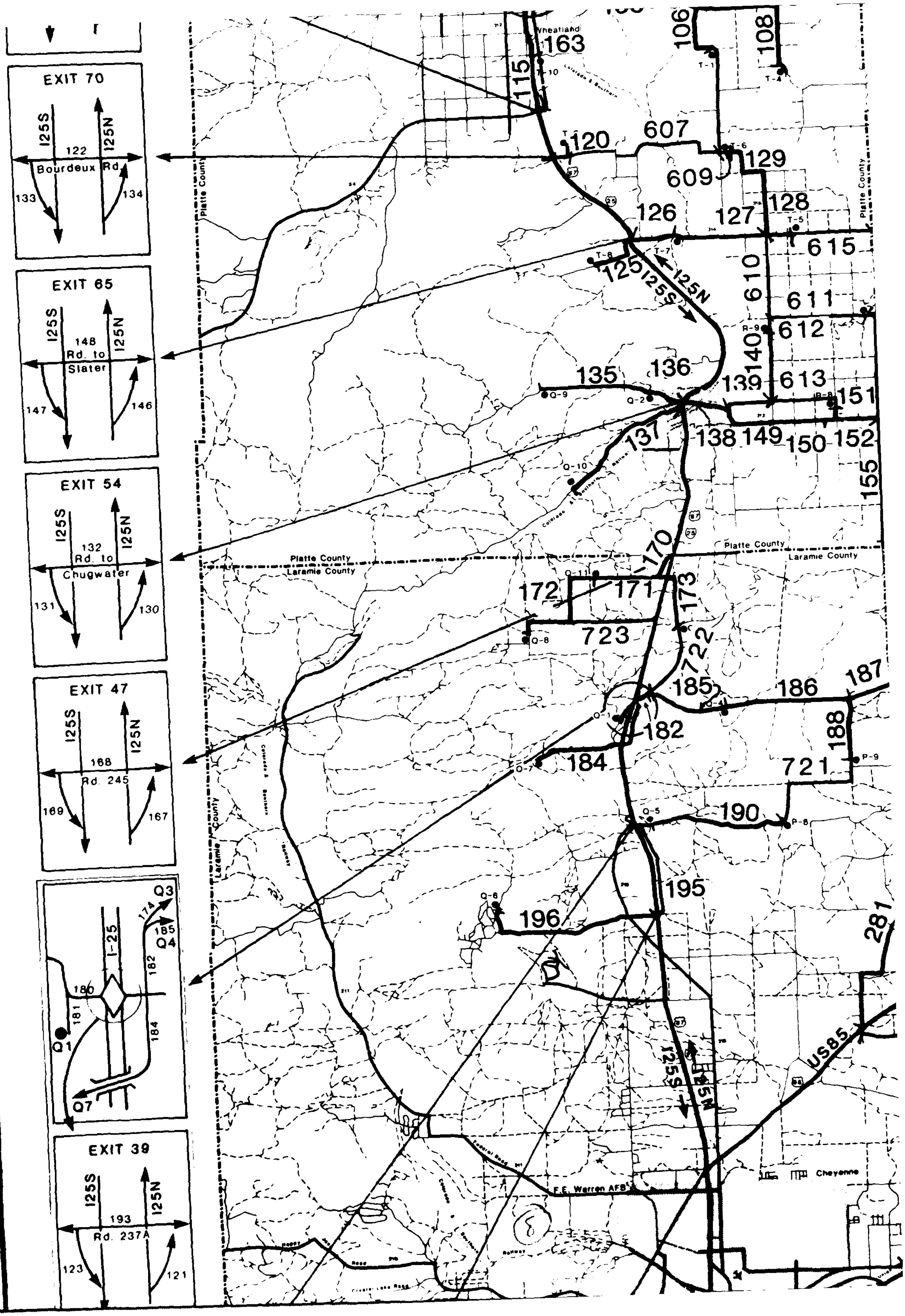


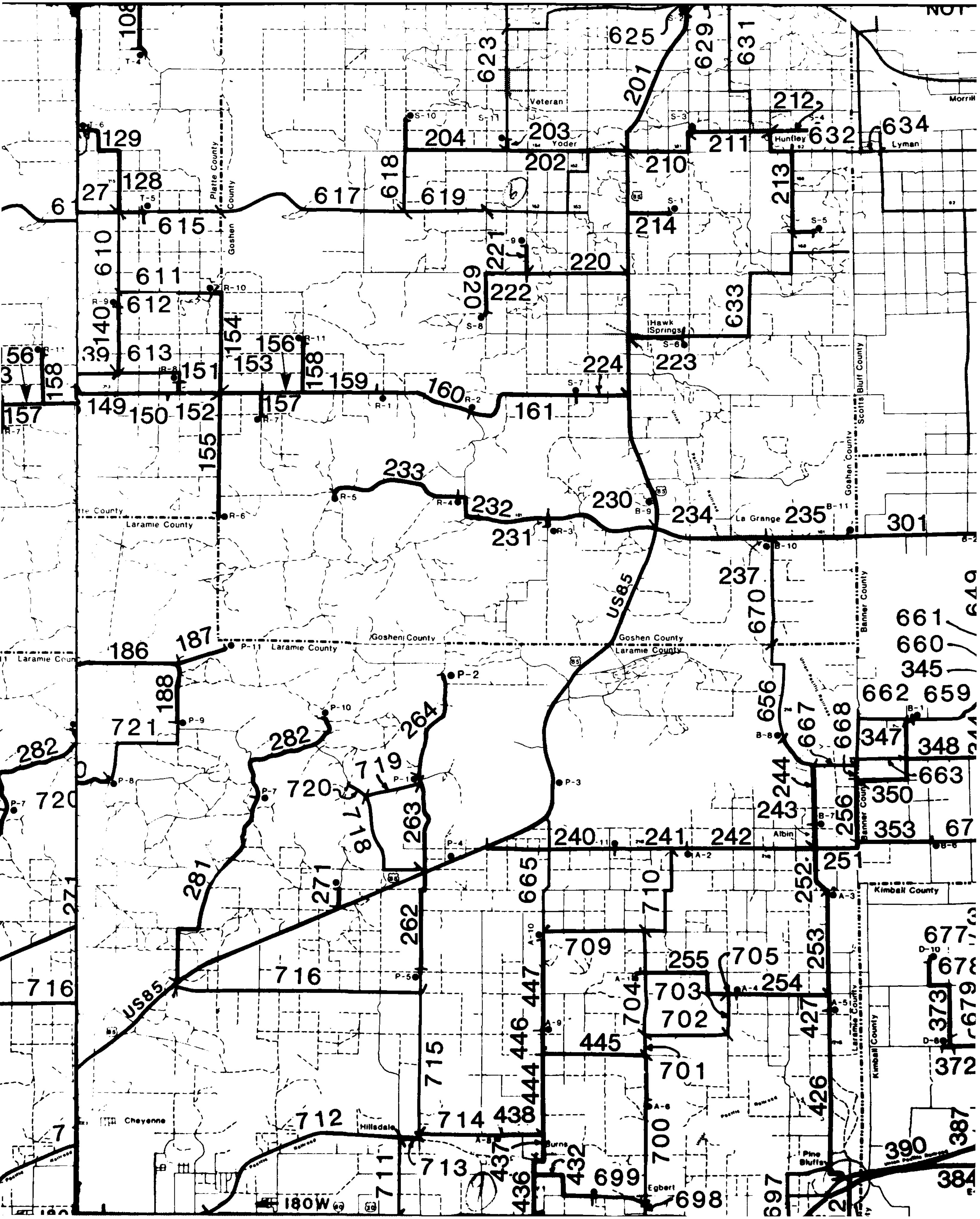
EXIT 80
125S
125N
99
98
97
I-25
102
101
103
105
163
EXIT 78
142
143
141
EXIT 73
124
WYO 34
114
119
EXIT 70
122
Bourdeux Rd
Platte County
Glendo
Burlington Northern
Fletcher Park Road
Guernsey
Hartville
Goshen County
600
601
602
603
101
103
105
106
107
108
109
110
115
120
163
607
129
Wheatland
T-1
T-2
T-3
T-4
T-6
T-10
T-11

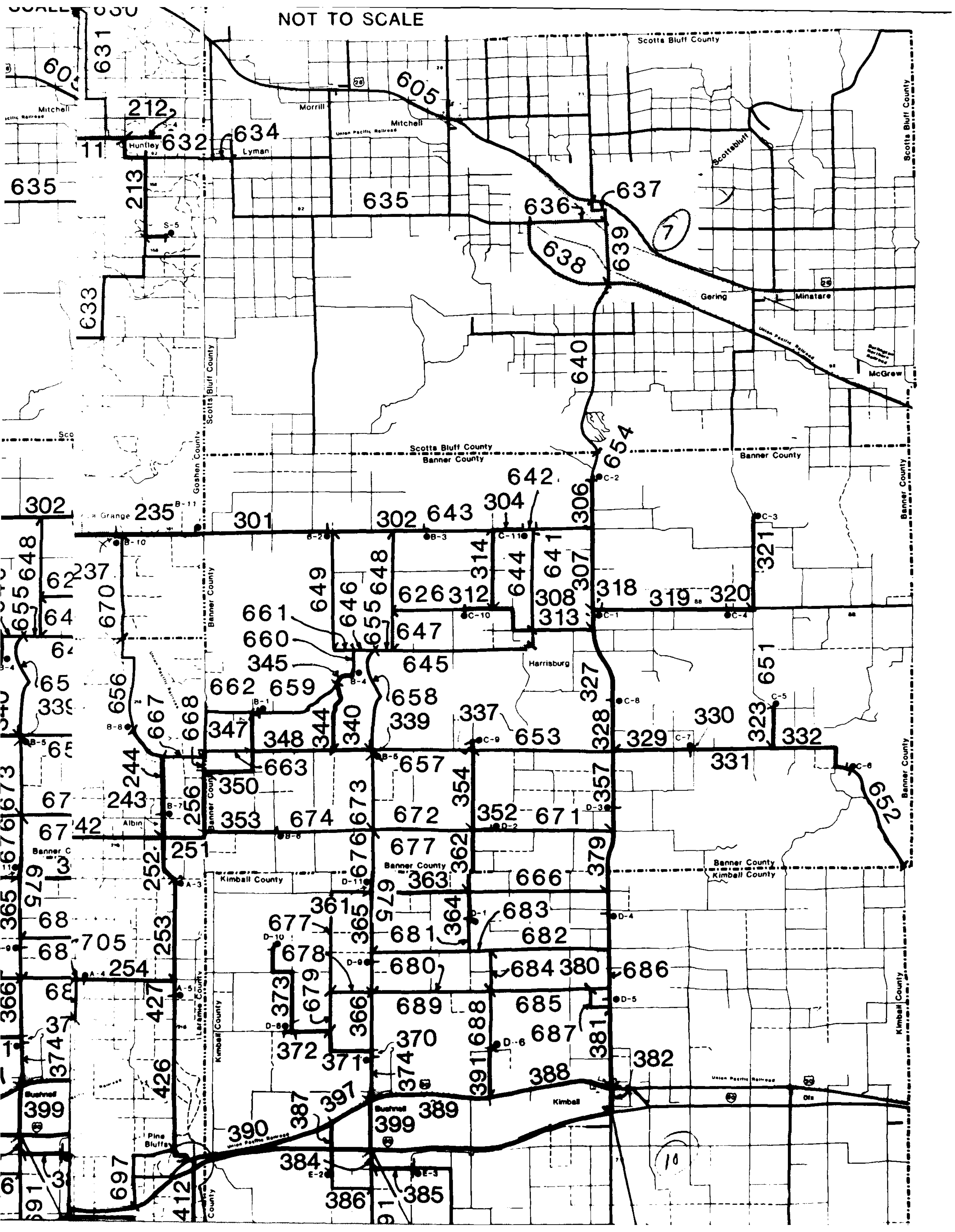

Goshen County
Goshen County
Platte County
Goshen County
Platte County
Goshen County
Goshen County
Fort Laramie Road
Hartville
Guernsey
Fort Laramie
Fort Laramie National Monument
604
Lingle
Torrington
Veteran
110
107
109
106
108
622
623
627
628
625
630
629
631
201
212
T-3
T-1
T-2

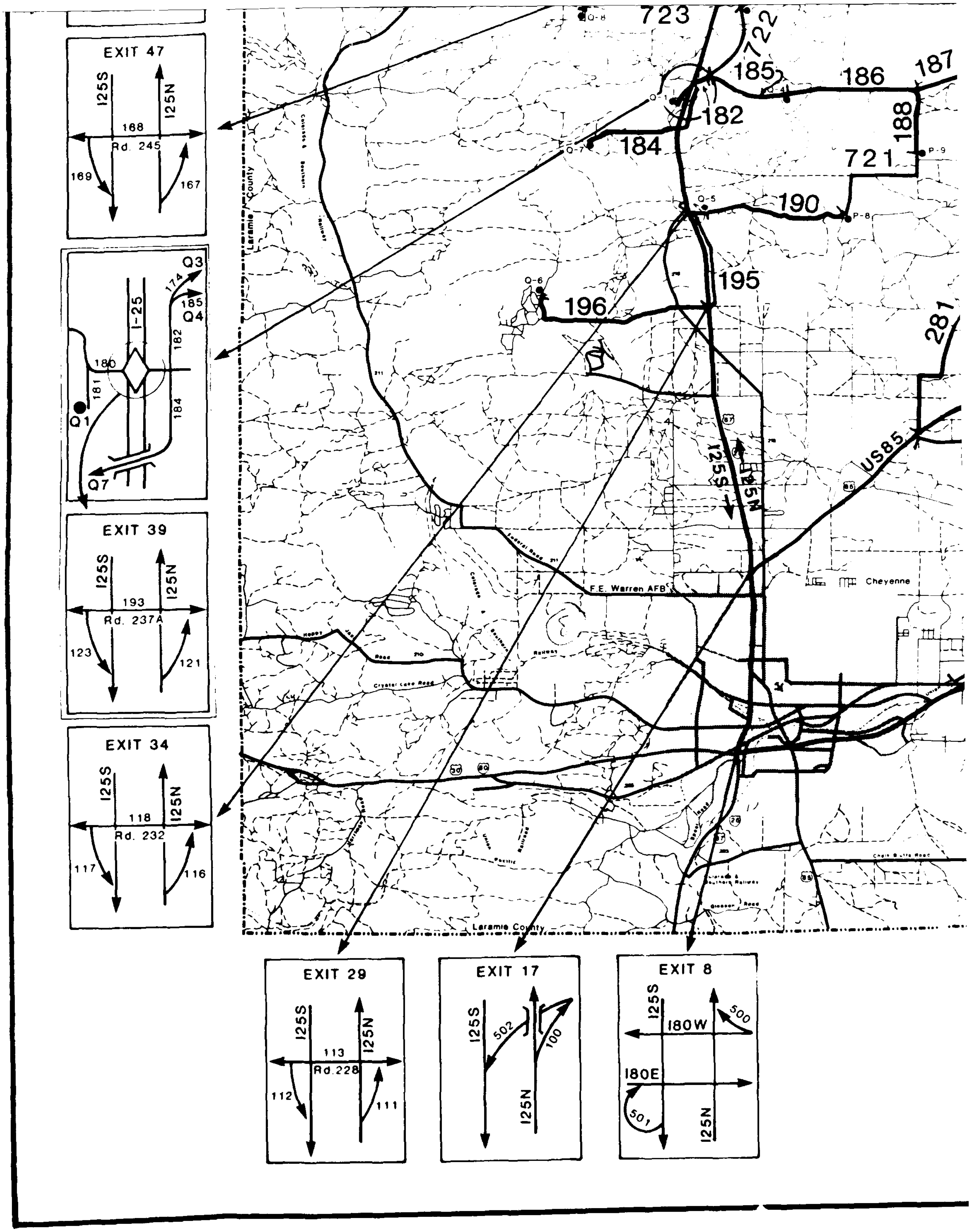
3)


LEGEND
Primitive Road, Unimproved Road Graded & Primitive, Unimproved, Graded & Drained Roads
Gravel or Stone Roads
Bituminous Road-Low Type, Paved Roads, Interstates Divided Highway
101-499 Transporter Erector Links
601-799 Additional Project-Related Links
US 85
Detail of Hawk Springs
NOT TO SCALE
Goshen County
Torrington
Scotts Bluff County
Morrill
Mitchell
605
630
631
212
634

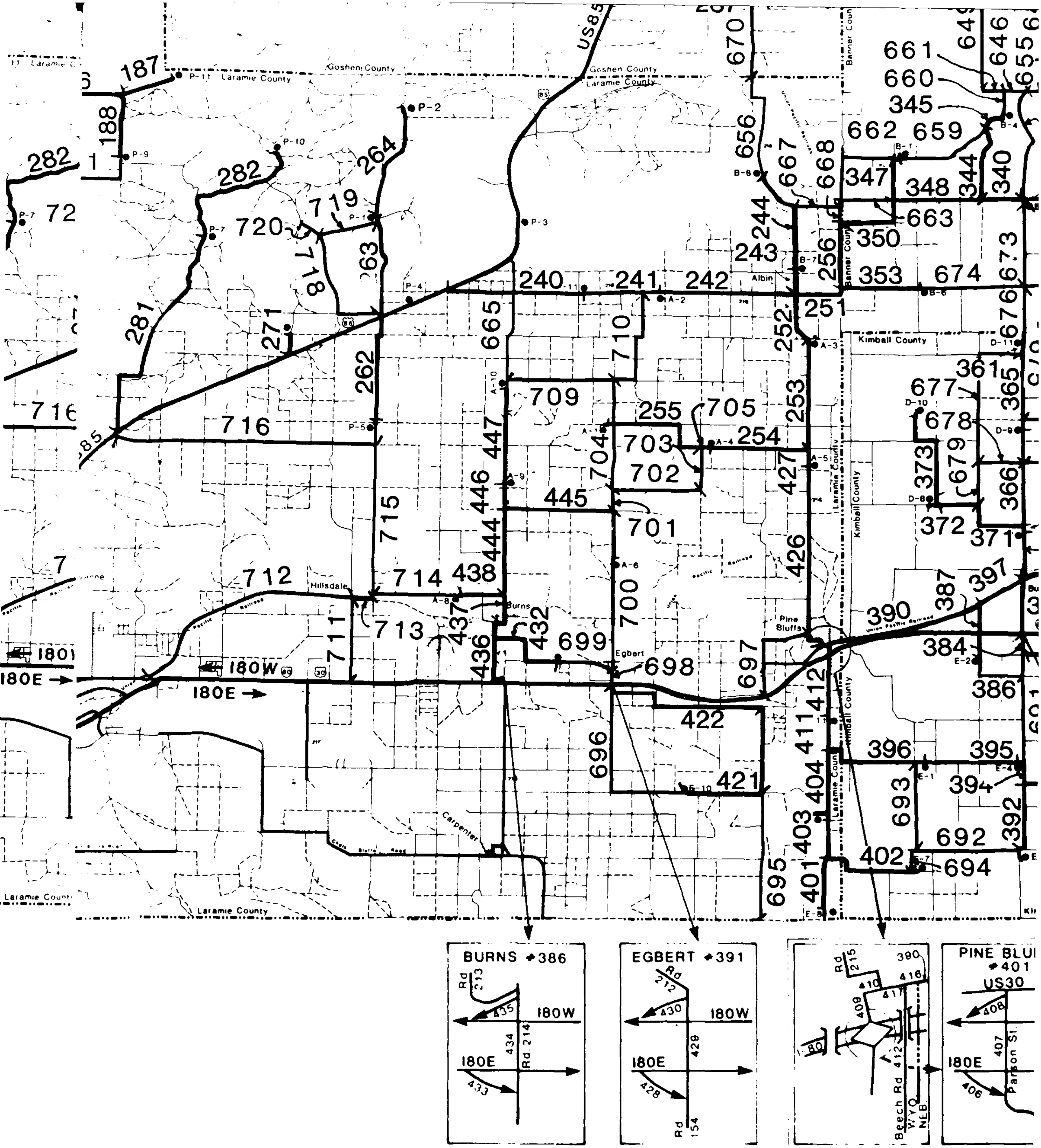

EXIT 70
125S
125N
122
Bourdeux Rd.
133
134
EXIT 65
125S
125N
148
Rd. to
Slater
147
146
EXIT 54
125S
125N
132
Rd. to
Chugwater
131
130
EXIT 47
125S
125N
168
Rd. 245
169
167
Q3
174
185
Q4
I-25
182
180
181
184
Q1
Q7
EXIT 39
125S
125N
193
Rd. 237A
123
121
Wheatland
163
115
106
108
120
607
129
609
126
127
128
615
125
125S
125N
610
611
612
140
135
136
139
613
151
137
138
149
150
152
155
Platte County
Laramie County
170
172
171
173
723
722
185
186
187
182
188
184
721
190
195
196
281
US85
125S
125N
Cheyenne
F.E. Warren AFB


Veteran
Yoder
Huntley
Lyman
Morrill
Hawk Springs
La Grange
Albin
Hillsdale
Burns
Egbert
Pine Bluffs
Cheyenne
Platte County
Goshen County
Laramie County
Scotts Bluff County
Banner County
Kimball County
US85
180W


NOT TO SCALE
Scotts Bluff County
Mitchell
Morrill
Union Pacific Railroad
Huntley
Lyman
Scottsbluff
Gering
Minatare
McGrew
Goshen County
Banner County
Harrisburg
La Grange
Albin
Kimball County
Laramie County
Kimball
Bushnell
Pine Bluffs
Dix



TRANSPORTER ERECTOR ROUTES AND ADDITIONAL INVENTORIED PROJE



-REL

PROJECT-RELATED ROADS

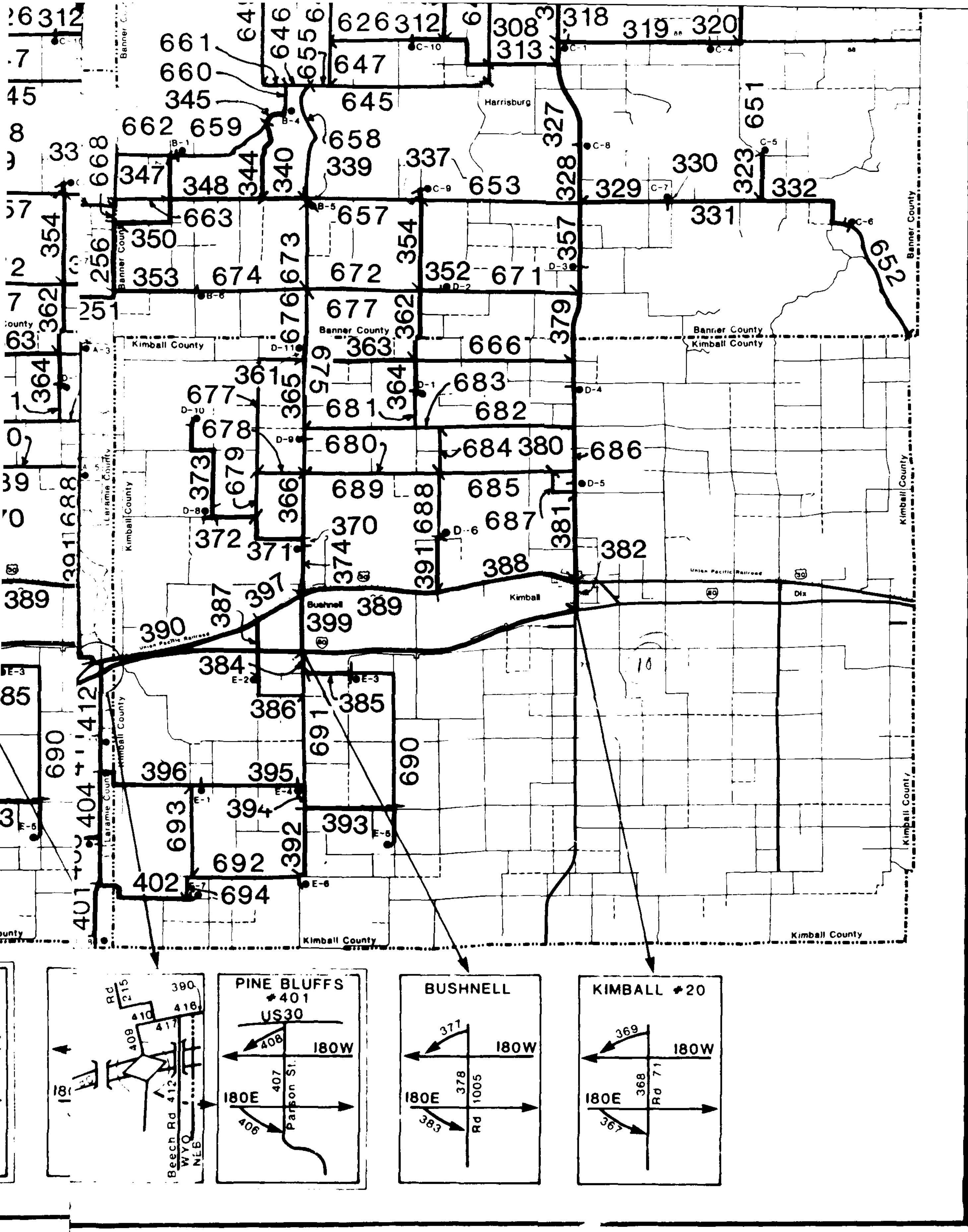
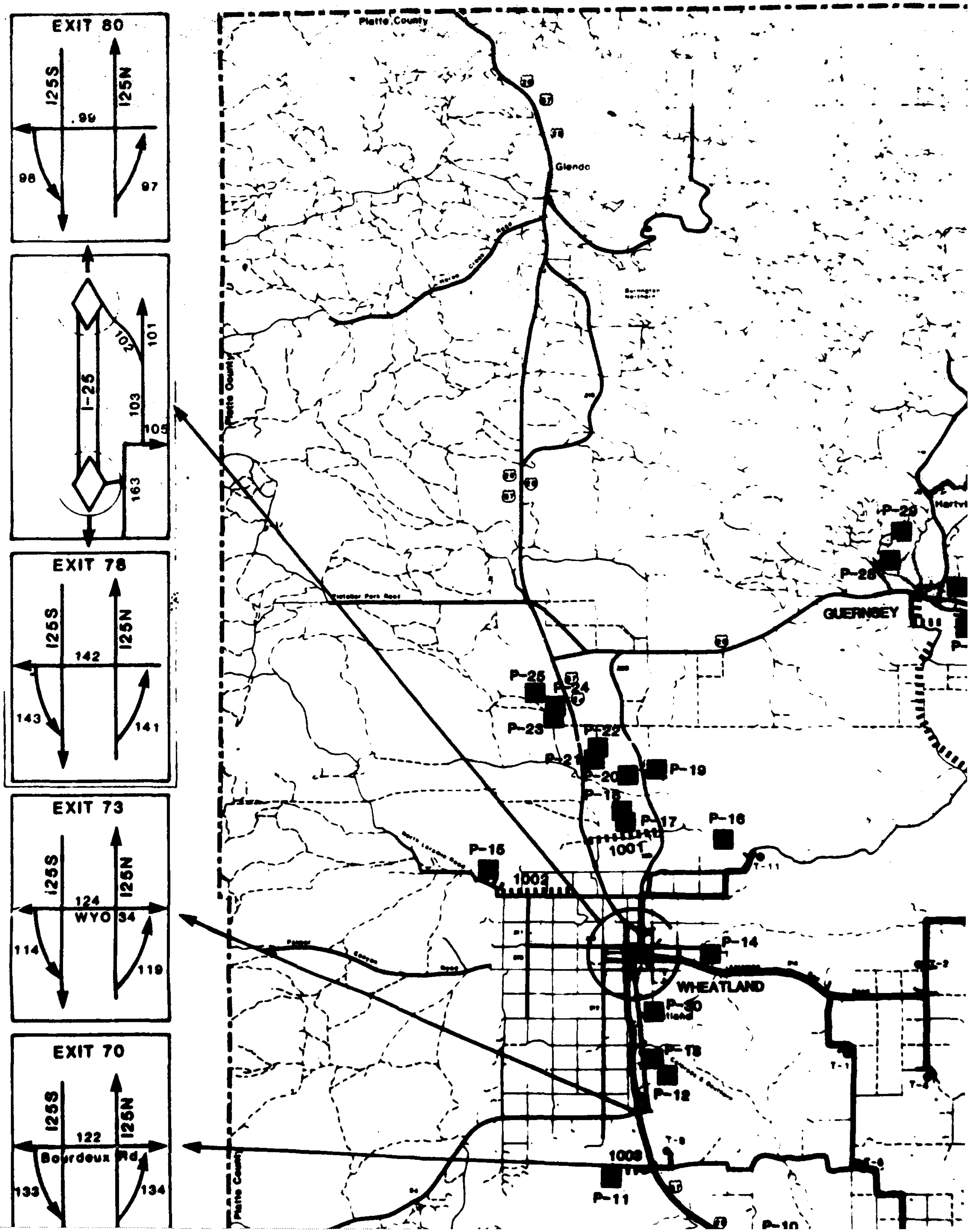


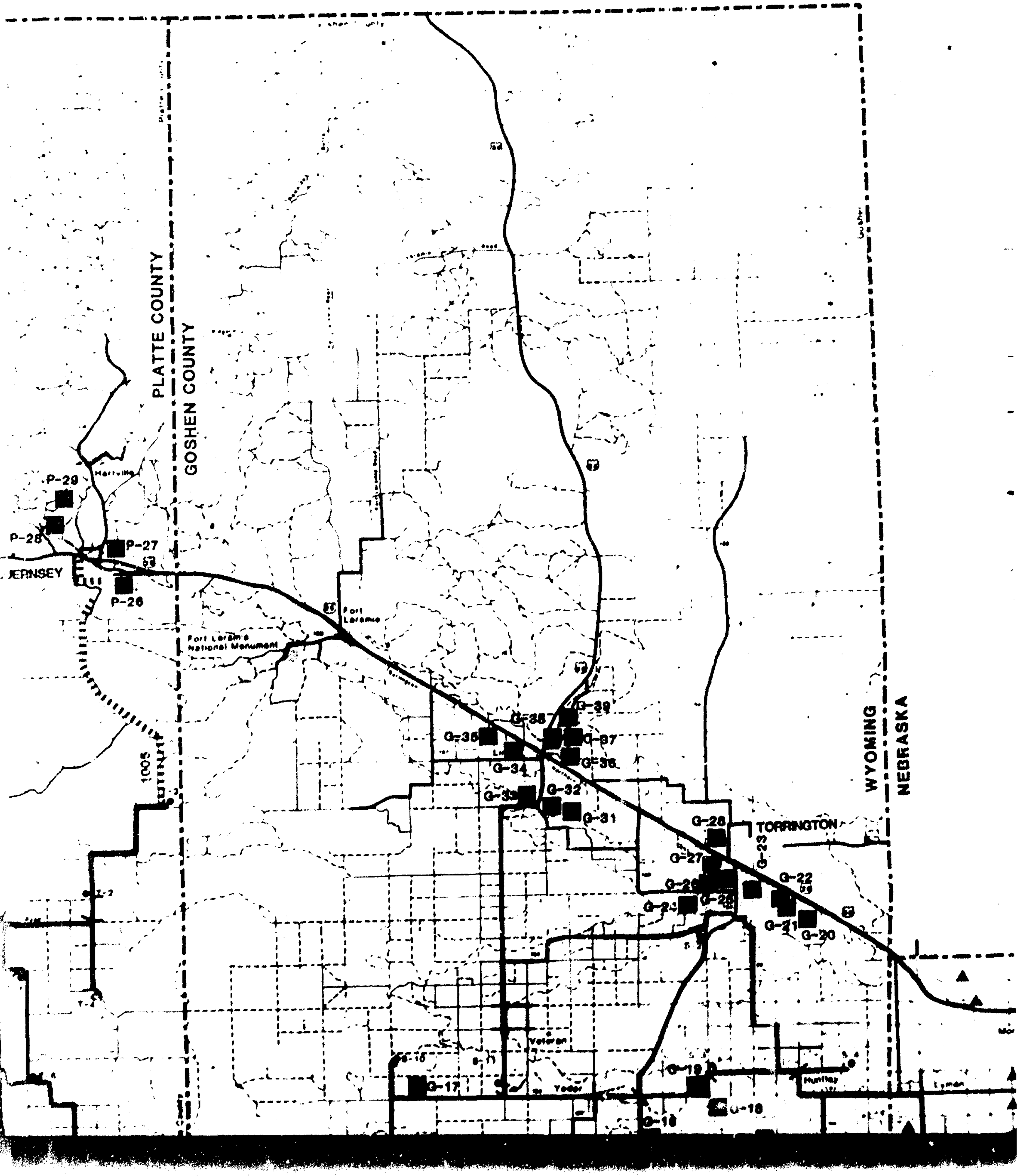
FIGURE NO. 2.5.1-3

7

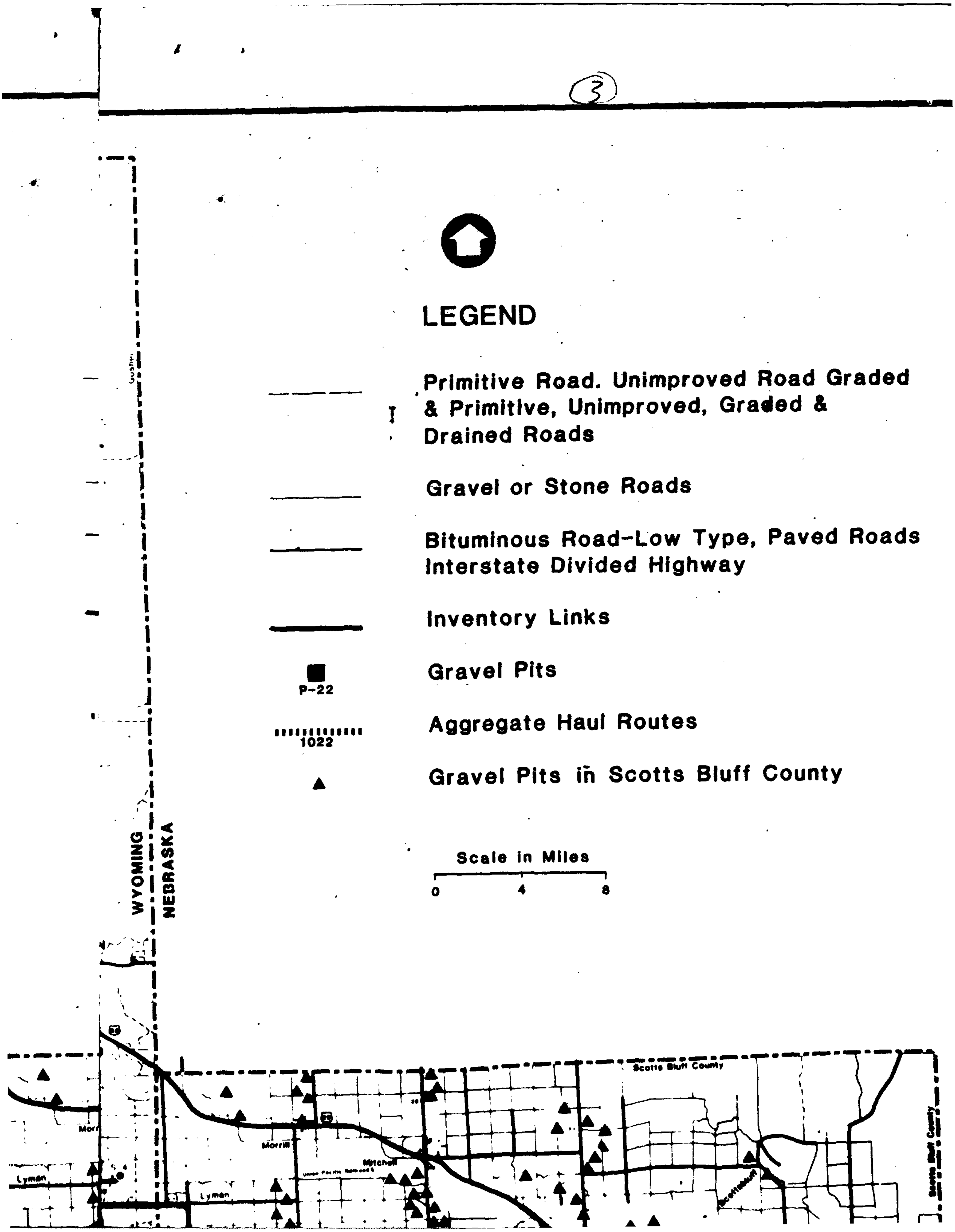


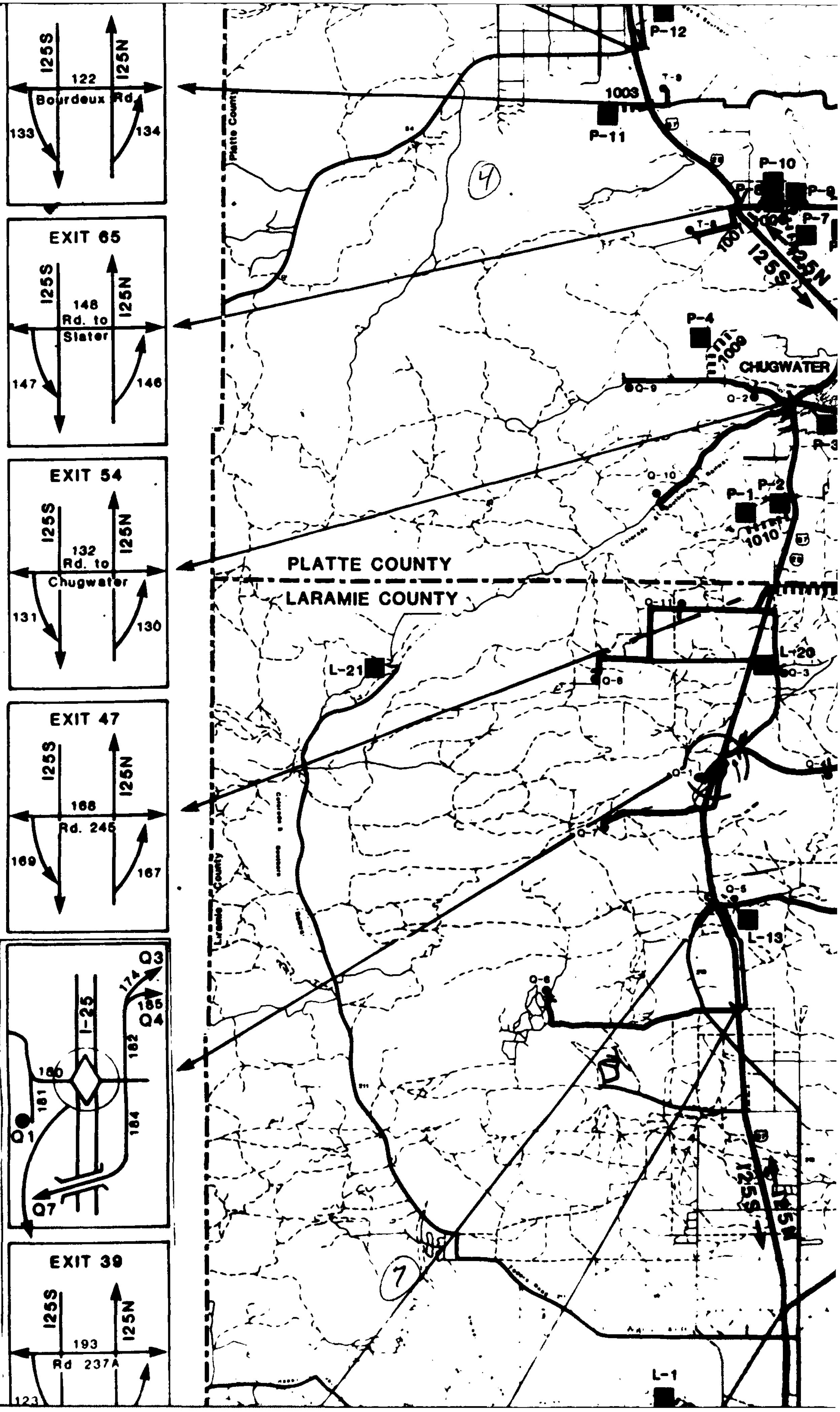
EXIT 80
I25S
I25N
99
98
97
I-25
102
101
103
105
163
EXIT 78
I25S
I25N
142
143
141
EXIT 73
I25S
I25N
124
WYO 34
114
119
EXIT 70
I25S
I25N
122
Bourdeux Rd.
133
134
Platte County
Glendo
GUERNSEY
WHEATLAND
P-29
P-28
P-25
P-24
P-23
P-22
P-21
P-20
P-19
P-18
P-17
P-16
P-15
P-14
P-30
P-13
P-12
P-11
P-10
1001
1002
1003
T-11
T-9

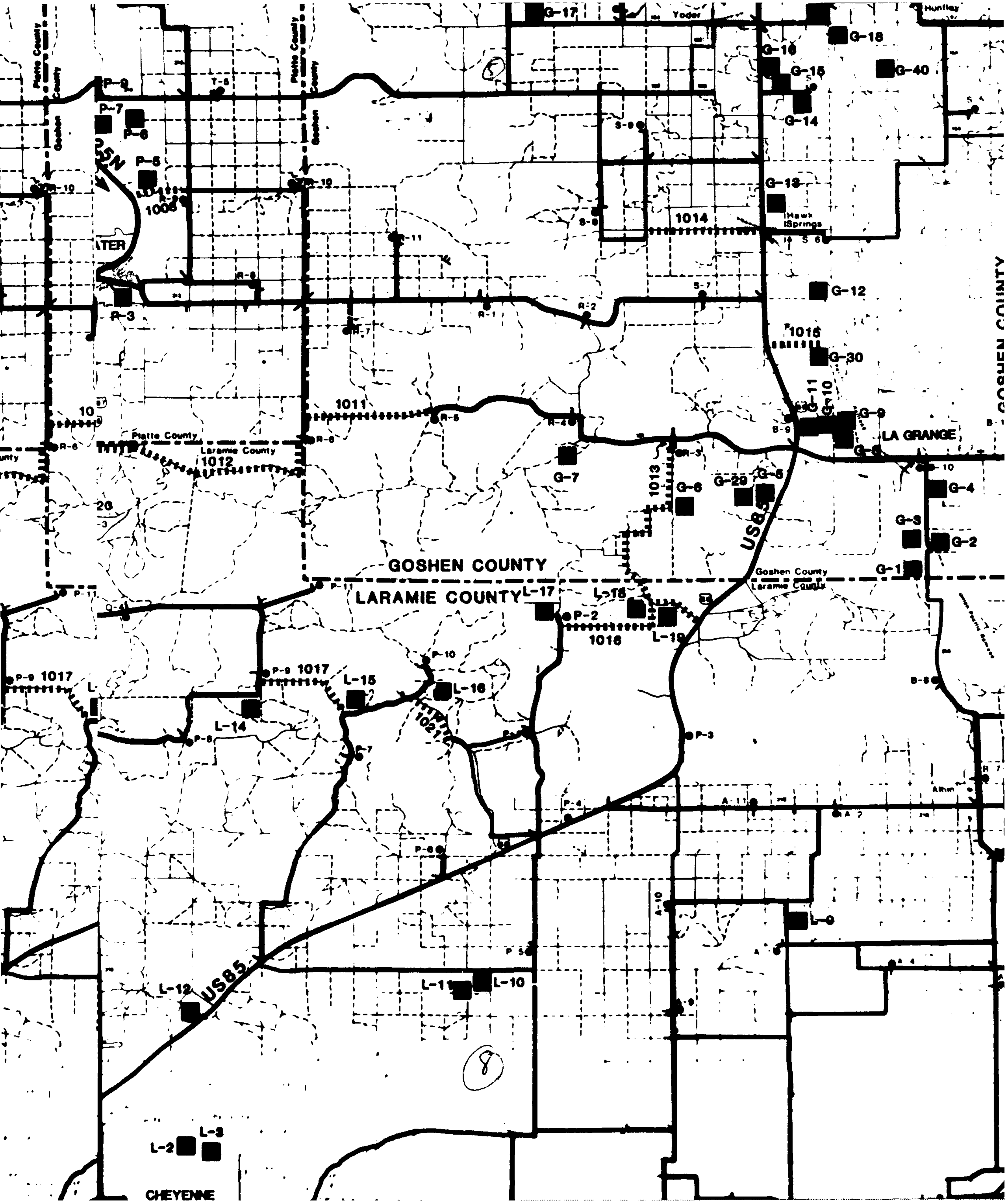
(2)



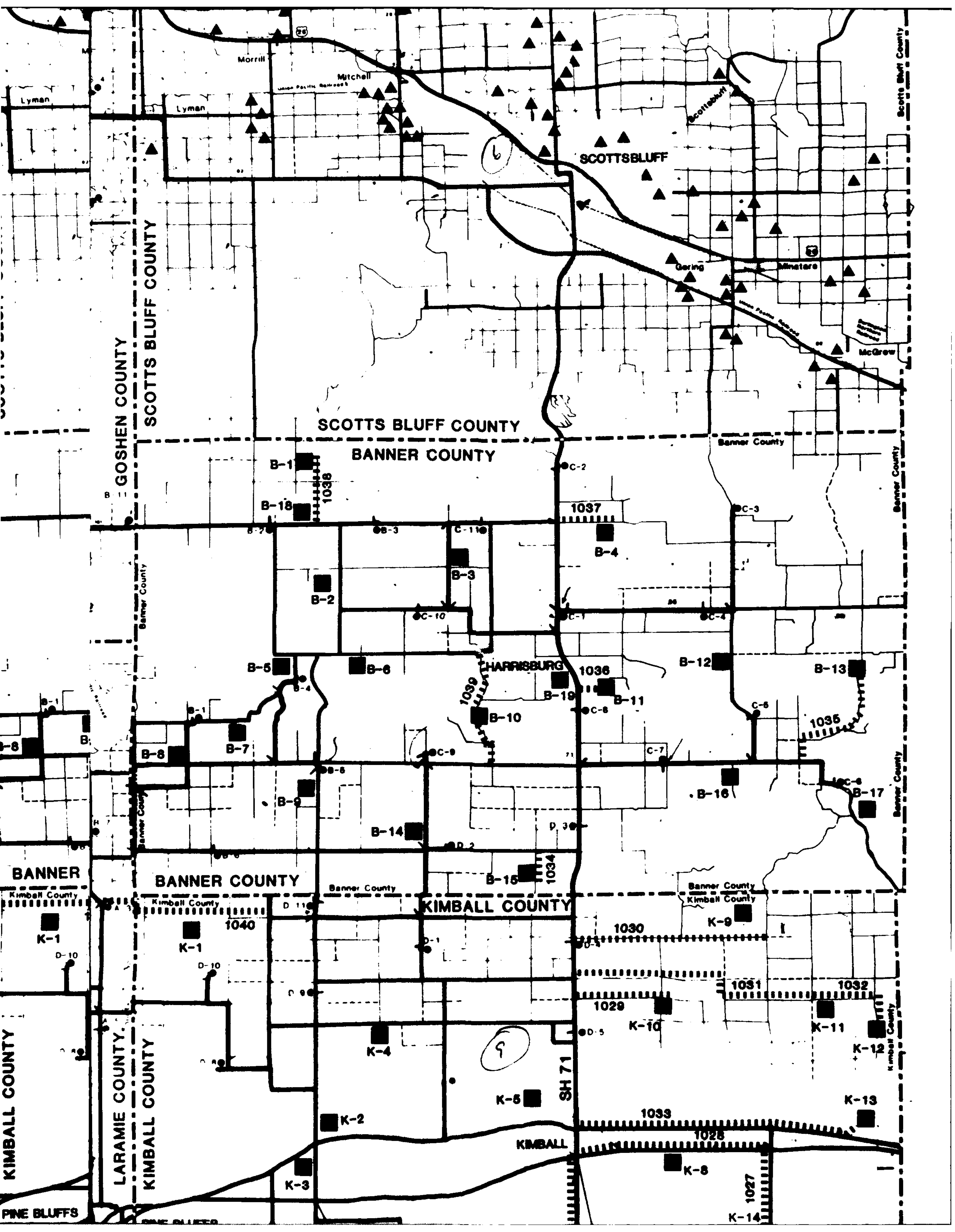
PLATTE COUNTY
GOSHEN COUNTY
Hartville
P-29
P-28
P-27
P-26
Fort Laramie
Fort Laramie National Monument
1005
G-35
G-38
G-39
G-37
G-36
G-34
G-33
G-32
G-31
G-28
TORRINGTON
G-27
G-23
G-22
G-26
G-25
G-24
G-21
G-20
WYOMING
NEBRASKA
Veteran
Yoder
G-17
G-19
G-18
G-16
Huntley
Lyman


3
LEGEND
Primitive Road. Unimproved Road Graded & Primitive, Unimproved, Graded & Drained Roads
Gravel or Stone Roads
Bituminous Road-Low Type, Paved Roads Interstate Divided Highway
Inventory Links
P-22
Gravel Pits
1022
Aggregate Haul Routes
Gravel Pits in Scotts Bluff County
Scale in Miles
0
4
8
WYOMING
NEBRASKA
Scotts Bluff County
Morrill
Mitchell
Lyman
Lyman
Scotts Bluff County

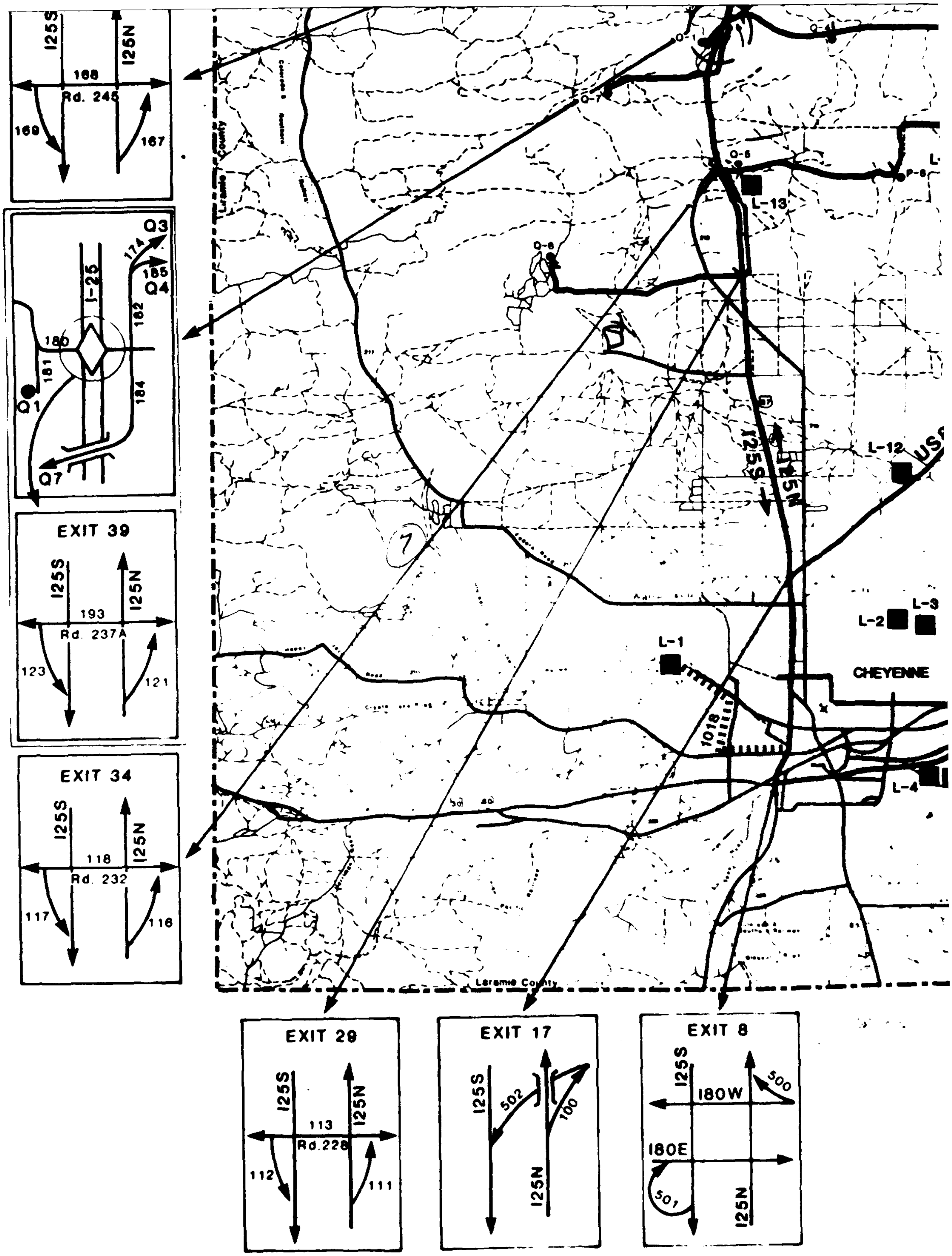

I25S
I25N
122
Bourdeux Rd.
133
134
EXIT 65
I25S
I25N
148
Rd. to
Slater
147
146
EXIT 54
I25S
I25N
132
Rd. to
Chugwater
131
130
EXIT 47
I25S
I25N
168
Rd. 245
169
167
Q3
174
185
Q4
I-25
182
180
181
Q1
184
Q7
EXIT 39
I25S
I25N
193
Rd 237A
123
P-12
1003
P-11
P-10
P-9
P-7
T-8
1007
1006
I25S
I25N
P-4
1009
CHUGWATER
Q-9
Q-2
P-3
Q-10
P-1
P-2
1010
PLATTE COUNTY
LARAMIE COUNTY
Q-11
L-21
L-20
Q-3
Q-8
Q-1
Q-7
Q-5
L-13
Q-6
I25S
I25N
L-1
Platte County
Laramie County
4
7



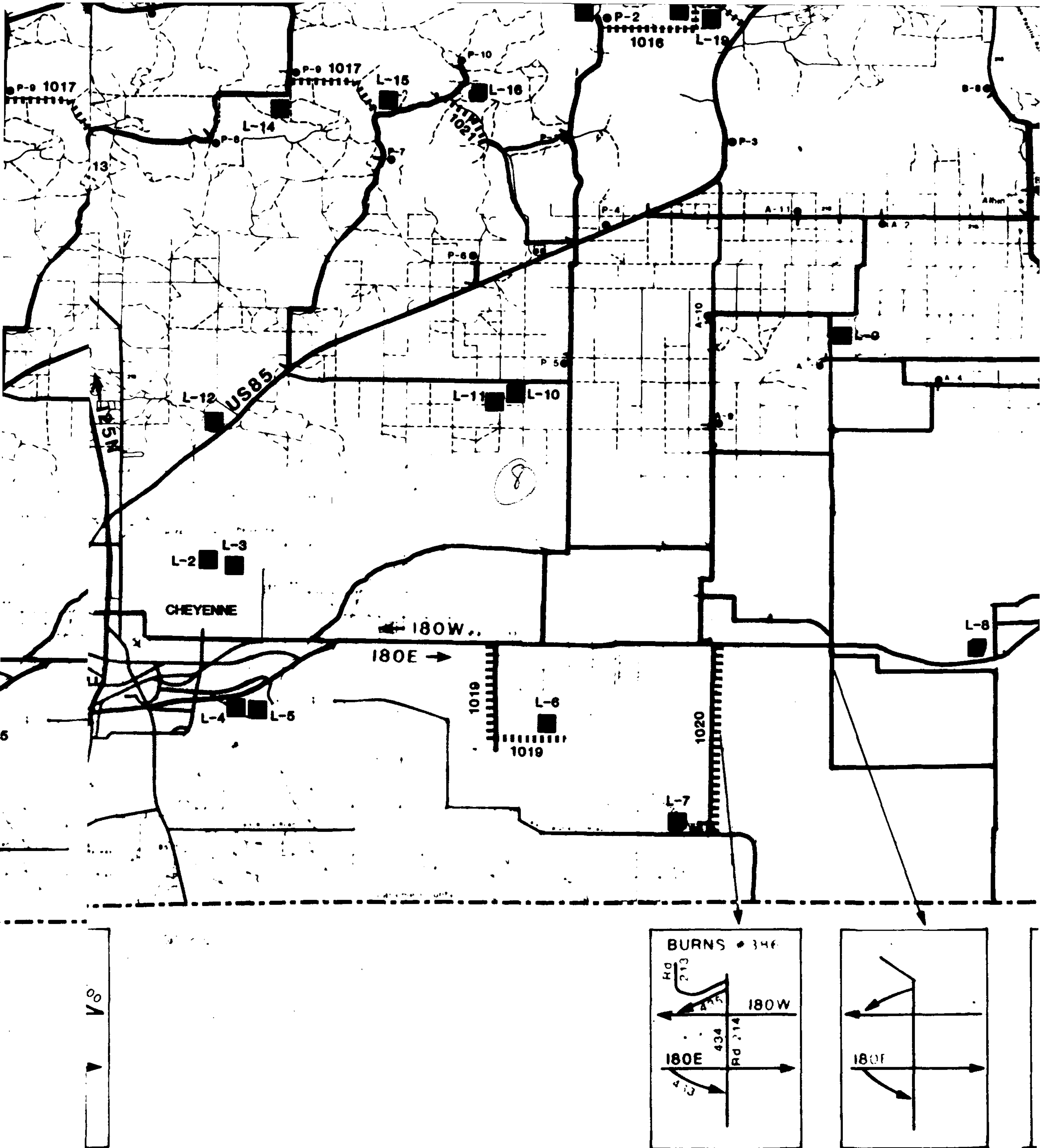
GOSHEN COUNTY
LARAMIE COUNTY
Platte County
Laramie County
Goshen County
LA GRANGE
Hawk Springs
Yoder
Huntley
CHEYENNE
US85
1011
1012
1013
1014
1015
1016
1017
1021
G-1
G-2
G-3
G-4
G-5
G-6
G-7
G-9
G-10
G-11
G-12
G-13
G-14
G-15
G-16
G-17
G-18
G-29
G-30
G-40
L-2
L-3
L-9
L-10
L-11
L-12
L-14
L-15
L-16
L-17
L-18
L-19
P-2
P-3
P-5
P-6
P-7
8



Morrill
Mitchell
Lyman
SCOTTSBLUFF
Scottsbluff
Gering
Minatare
McGrew
Scotts Bluff County
GOSHEN COUNTY
SCOTTS BLUFF COUNTY
BANNER COUNTY
Banner County
HARRISBURG
BANNER
KIMBALL COUNTY
Kimball County
LARAMIE COUNTY
SH 71
KIMBALL
PINE BLUFFS
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
B-17
B-18
B-19
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
D-2
D-5
D-10
K-1
K-2
K-3
K-4
K-5
K-8
K-9
K-10
K-11
K-12
K-13
K-14
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
6
9

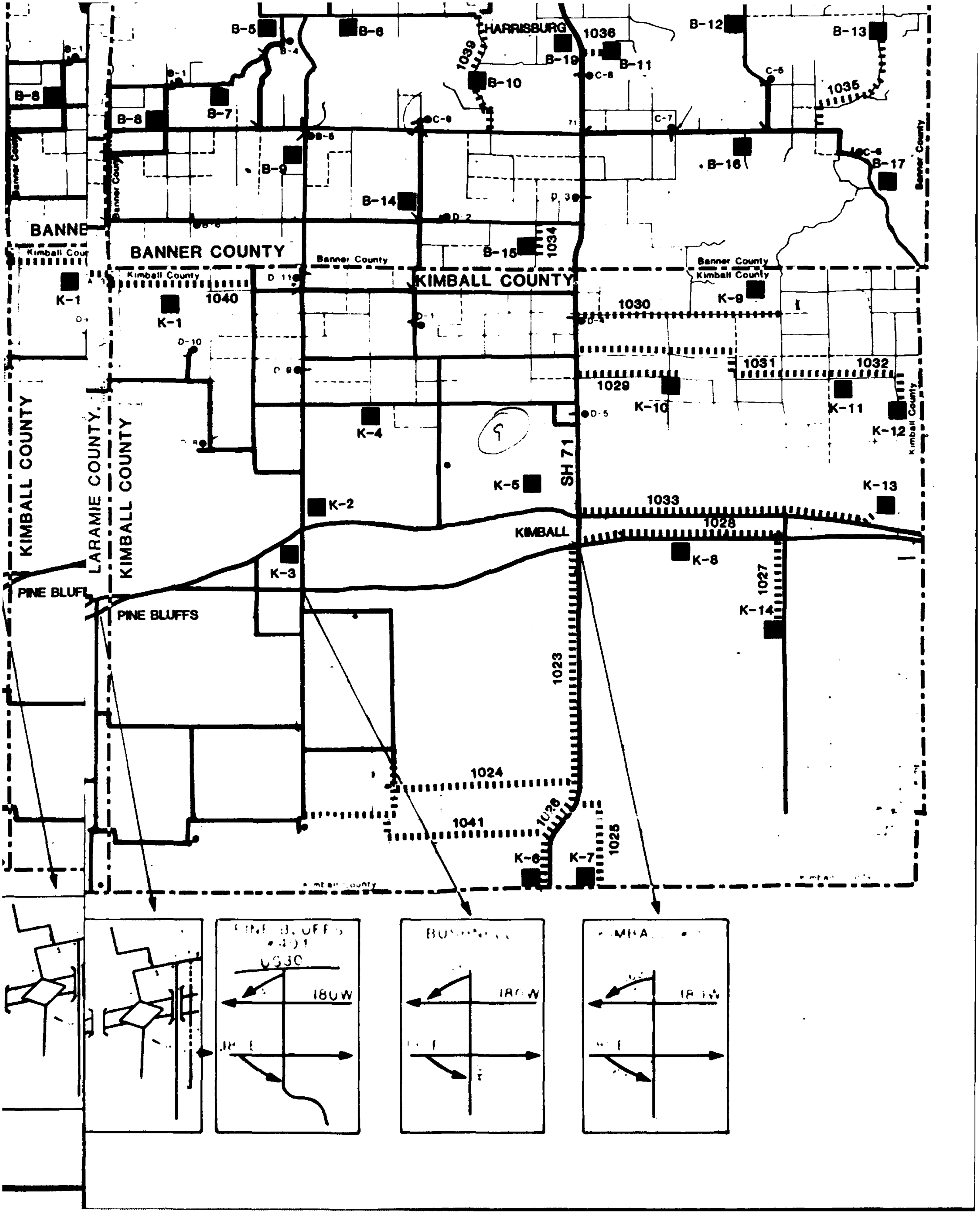


LOCATION OF AGGREGATE SOURCES AND AGG



EGAT

ND AGGREGATE HAUL ROUTES


HARRISBURG
BANNER COUNTY
Banner County
Kimball County
KIMBALL COUNTY
LARAMIE COUNTY
SH 71
KIMBALL
PINE BLUFFS
B-5
B-6
B-7
B-8
B-9
B-10
B-11
B-12
B-13
B-14
B-15
B-16
B-17
B-19
K-1
K-2
K-3
K-4
K-5
K-6
K-7
K-8
K-9
K-10
K-11
K-12
K-13
K-14
C-6
C-7
C-8
C-9
D-2
D-4
D-5
D-9
D-10
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1039
1040
1041
18UW